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ABSTRACT

This report contains the proceedings of the first of two hearings that explored the risks of environmental toxins to children. Testimony concerned the special vulnerability of children to toxins; the dangers of lead poisoning; instances of childhood cancer, birth defects, and developmental problems; passive smoking; child health in the California farm workers' communities; and the relationship between environmental toxins and child health as discussed by physicians participating in a Kids and the Environment seminar. A fact sheet describes child vulnerability to environmental toxins; lead poisoning; passive smoking; cancer risk; home pesticide use; and child cancer clusters in California. A copy of "What's Gotten into Our Children," a report prepared by Children NOW, is included. The report describes children and the environment and reviews the dangers of toxins to children, depending on what they eat and where they live, learn, and play. Twelve statements were delivered in person and sixteen prepared statements or materials that supplement verbal testimony were collected. (BC)

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ENVIRONMENTAL TOXINS AND CHILDREN: EXPLORING THE RISKS, PART I

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HEARING

BEFORE THE

SELECT COMMITTEE ON CHILDREN, YOUTH, AND FAMILIES HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

HEARING HELD IN OAKLAND, CA, SEPTEMBER 6, 1990

Printed for the use of the
Select Committee on Children, Youth, and Families

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ENVIRONMENTAL TOXINS AND CHILDREN: EXPLORING THE RISKS, PART I

THURSDAY, SEPTEMBER 6, 1990

HOUSE OF REPRESENTATIVES,
SELECT COMMITTEE ON CHILDREN, YOUTH, AND FAMILIES,
Washington, DC.

The select committee met, pursuant to notice, at 9:40 a.m., in the Children's Hospital Oakland Auditorium, Oakland, California, Hon. George Miller presiding.

Members present: Representatives Miller, Boxer, and Stark.

Staff present: Karabelle Pizzigati, staff director; Felicia Kornbluh, research assistant; and Dennis G. Smith, minority staff director.

Chairman MILLER. The Select Committee on Children, Youth, and Families will come to order.

The purpose of this meeting this morning is to conduct a hearing on environmental toxins and children, exploring the risks. This is the first in a series of hearings that the select committee will be conducting on this subject, both in the field as we are here today in Oakland, and next week in Washington, D.C. And then in the early part of next year, additional hearings will be scheduled.

As we have obviously witnessed, the 1990s mark the coming of age and the second renewal of the environmental movement in the United States. From every quarter of our society, and every section of the country, come demands to protect our wildlife, our water, our air, our soil, and our crops. No one wants to live beside a toxic dump, and no one wants to work in fields that have been sprayed with carcinogenic pesticides.

While we fear for our own health and safety, we also fear for our children. And despite grave concerns that surround the discussions of children and environmental toxins, with few exceptions, we have only begun to turn that concern into action. This hearing is the beginning of an effort by the Select Committee on Children, Youth, and Families to move forward on these vital questions.

Science tells us that children's rapid growth and development may make them especially vulnerable to environmental toxins. And recent studies suggest that their vulnerability is being tested every day.

Last year's alarm over the distinct risk to children from pesticides on apples, new evidence about the dangers of lead poisoning, the continuing concerns about asbestos in schools are just some of the threats that our children face. Everywhere that children live,

learn, and work exposes them to toxins and pollutants that may jeopardize their healthy development.

Unfortunately, for substances other than lead, research is in its infancy. There remain many more questions than there are answers. In the select committee tradition, this series of hearings will begin today to scrutinize the best available evidence about children's vulnerability to environmental toxins, and focus attention on the overlooked, but simmering, anxiety about child health and safety.

In California, the state often thought of as light years ahead of the nation in efforts to protect the environment, recent studies have directed attention to the special vulnerability of children to environmental hazards. Studies have focused on concerns about "clusters" of rare childhood cancers in the most agricultural regions of the State; researchers have discovered high levels of lead poisoning in the blood of Los Angeles and Oakland children, and children whose parents work at farm labor have been born with severe birth defects.

While life-threatening effects, such as cancer and birth defects, are of great concern, children suffer other developmental effects and illnesses as well, which are more subtle in their manifestations, but also attributable to environmental exposures.

The U.S. Office of Technology Assessment in Washington, D.C., recently released a report documenting the effects of neurotoxins on learning capacity and on physical and mental health. Lead is a potent neurotoxin. So are some of the pesticides and food additives. The possibility of low-income children, who already face formidable obstacles in succeeding in school, might be held back by environmental factors—some of which occur more frequently in low-income than high-income communities—is very troubling, indeed.

And the effects of involuntary, or "passive" smoking, on children's respiratory health is well documented. And again this morning, apparently, especially in tandem with other indoor pollutants at home and in school.

Today, the select committee will begin investigating these issues. Children NOW will issue a new report on Children and the Environment that identifies their special vulnerabilities to poisons in the environment, offers guidance to parents how to minimize health risks, and urges policymakers to meet their responsibility to the public's health.

Ramona Ramirez and other members of the farmworking community will tell us about the health effects their children have suffered in recent years. They will speak not only of the current crisis of tragic levels of childhood cancer sweeping through the San Joaquin Valley, but also longer-term, quieter crisis of farm work in the United States that affects their health: the low wages, lack of service, the paucity of public support that we inflict on those who do the hardest and most necessary jobs in our society.

We are pleased to be able to draw upon the expertise of the participants in a "Kids and the Environment" seminar. It is being held this weekend for physicians. It will take place at U. C. Berkeley. Experts from the physicians' conference will share their state-of-the-art knowledge on the relationship between environmental

toxins and child health, and will recommend strategies for research and policies for the future.

One of these experts, Dr. Cynthia Bearer, who is also head of the new effort at Children's Hospital here at Oakland. As Chief of the Division of Pediatric Environmental Health, she is looking at these important questions from the perspective of both clinical practice and developmental research.

I would like to especially express my gratitude and thanks to everyone here at Children's Hospital at Oakland for all of the help that they have provided the committee and the staff in arranging for this hearing. This is a community resource that we have called upon—the select committee, that is—many, many times to help us find answers to some of the most troubling questions facing this nation's children.

We in the East Bay, and in the entire Bay area, in fact, are very, very proud of this institution and all that it has lent to trying to better the health of this region's children, and of the nation's children.

I would like to welcome to the committee my colleagues, Congresswoman Barbara Boxer who is a Member of the select committee, and Congressman Pete Stark, who is the Chairman of the Subcommittee on Health of the Ways and Means Committee in the Congress of the United States.

[Opening statement of Congressman George Miller follows:]

OPENING STATEMENT OF HON. GEORGE MILLER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA AND CHAIRMAN, SELECT COMMITTEE ON CHILDREN, YOUTH, AND FAMILIES

The 1990s mark the coming-of-age of the environmental movement in the U.S. From every quarter of our society, and every section of the country, come demands to protect our wildlife, our water, our air, our soil, and our crops. No one wants to live beside a toxic waste dump, and no one wants to work in fields that have been sprayed with carcinogenic pesticides.

While we fear for our own health and safety, perhaps our greatest fear from environmental contamination is the threat it poses to our children. We worry whether our children will have the resources they need when they have families? Will they be healthy enough to enjoy them? Will their conditions of work, of housing, and of community allow our children to live with security? Or will they condemn our children to the same worries and anxieties that beset us today?

Despite the grave concern that surrounds discussions of children and environmental toxins, with few exceptions, we have only begun to turn that concern into action. This hearing is the beginning of an effort of the Select Committee on Children, Youth, and Families, to move forward on these vital questions.

Science tells us that children's rapid growth and development may make them especially vulnerable to environmental toxins. And recent studies suggest that their vulnerability is being tested every day.

Last year's alarm over the distinct risk to children from pesticides on apples, new evidence about the dangers of lead poisoning, and continuing concerns about asbestos in schools are only some examples of the threats children face. Everywhere that children live, play, learn and work exposes them to toxins and pollutants that may jeopardize their health and development.

Unfortunately, for substances other than lead, research is in its infancy. There remain many more questions than there are answers. In the Select Committee tradition, the series of hearings we begin today will scrutinize the best available evidence about children's vulnerability to environmental toxins, and focus attention on the overlooked, but simmering, anxiety about child health and safety.

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We are pleased to be able to draw upon the expertise of participants in a "Kids and the Environment" seminar for physicians, which will take place tomorrow in Berkeley. Experts from the physicians' conference will share their state-of-the-art knowledge on the relationship between environmental toxins and child health, and will help recommend a strategy of research and policies for the future.

One of these experts, Dr. Cynthia Bearer, is also at the head of a new effort at Children's Hospital Oakland. As chief of the Division of Pediatric Health, she is looking at these important questions from the perspective of both clinical practice and developmental research.

I especially want to express my appreciation to the staff of Children's Hospital Oakland for hosting this important hearing and for their continuing fine work to ensure better health for our children.

I welcome all of you today to Children's Hospital, and look forward to your testimony.

"Environmental Toxins and Children: Exploring the Risks"

A FACT SHEET

MILLIONS OF CHILDREN VULNERABLE TO ENVIRONMENTAL TOXINS

- More than seven million of the nation's children under age 18 suffer from one or more mental disorders. Exposure to toxic substances before or after birth is one of several risk factors that appear to make certain children vulnerable to these disorders. (Office of Technology Assessment, 1990)

- The World Health Organization cites the following factors which may influence the vulnerability of children as compared with adults when exposed to chemicals: larger body surface area in relation to weight; higher metabolic rate and oxygen consumption per unit body weight; different body composition; greater energy and fluid requirements per unit body weight; special dietary needs; rapid growth during which chemicals may affect growth or become incorporated into tissues; and functionally immature organs and body systems. (World Health Organization, 1986)

MORE CHILDREN LEAD POISONED THAN PREVIOUSLY BELIEVED

- One child in six in the U.S. has dangerously elevated blood lead levels (above 10 ug/dL), including more than half of all African-American children in poverty; 400,000 newborns are delivered with toxic levels each year. (Needleman, 1990)

- Children who had elevated lead levels in their teeth at ages 6 and 7 were seven times more likely than young children with low dentin lead levels to have dropped out of school and six times more likely to have a reading disability that persisted into adolescence. (Needleman, 1990)

- Prenatal exposure to lead has been linked to delayed mental development as late as 24 months of age. At age 5, the effects of postnatal, rather than prenatal, lead exposure become pronounced. Lead exposure is associated with a range of effects from severe retardation to lower IQ, speech and language impairments, learning disabilities, and poor attention skills. (Needleman, 1990)

CHILDREN SUFFER FROM PASSIVE SMOKING

- Children of smoking parents have from 20% to 80% more respiratory problems such as wheezing, coughing, and sputum production than do children of non-smokers, as well as increased rates of chronic middle ear effusions and infections which can lead to hearing loss and consequent speech pathology. (National Academy of Sciences, 1986)

- Lung function of school-age children with smoking parents is as much as 10% lower than that of children with non-smoking parents. (Wu-Williams, 1990; Samet, 1987)

- Infants of parents who smoke have significantly more pneumonia and bronchitis than do infants of non-smokers. Studies show children of smoking parents are hospitalized for respiratory infections 20% to 70% more often than children of non-smoking parents. An estimated 8.7 to 12.4 million children are exposed to cigarette smoke in their homes. (Surgeon General, 1986; American Academy of Pediatrics, 1986)

- Studies have shown that children of smoking parents have reduced growth and development. (National Academy of Sciences, 1986)

CHILD PESTICIDE EXPOSURE MAY AFFECT LIFETIME CANCER RISK/NEUROLOGICAL DEVELOPMENT

- The average child receives four times more exposure than an adult to eight widely used cancer-causing pesticides found in food. Because of their exposure to pesticides alone, as many as 6,200 children may develop cancer sometime in their lives. More than 50% of the lifetime cancer risk from carcinogenic pesticides used on fruit is estimated to occur during a child's preschool years. (Natural Resources Defense Council, 1989)

- From 17% to 58% of the country's 18 million children ages 1 to 5 are being exposed to neurotoxic organophosphate pesticides at levels above what the federal government considers safe. (Natural Resources Defense Council, 1989)

- Toxic substances, such as lead and organochlorine pesticides like DDT, are known to be present in breast milk and are transferred to the nursing child. The amount of toxic substances in a breastfeeding child can surpass levels in the mother's body. (Wolff, 1990)

HOME PESTICIDE USE PLACES CHILDREN AT RISK OF ILLNESS

- In Dallas, Texas, a review of 37 hospitalized pesticide poisonings among infants and children at the Children's Medical Center revealed five cases were due to pesticide exposure from playing on carpets and floors of homes following spraying or fogging inside residences. (Zwiener, 1988)

- Six of 21 children admitted to Arkansas Children's Hospital for organophosphate poisoning were judged to have been exposed following insecticide spraying inside the home. (Fenske, 1990)

- Parental use of pesticides both in the home and in the garden may increase the risk of childhood leukemia as much as seven-fold. (Lowengart, 1987)

CALIFORNIA CHILD CANCER CLUSTERS/BIRTH DEFECTS RAISE CONCERN

- In the agricultural community of McFarland, California (population 6,400), ten cases of cancer in children under 20 were observed from 1975 to 1985 when three cases would have been expected. From 1982 to 1985, when one case would have been expected, eight were observed. (Kern County Health Department, 1986)

- In Earlimart, California (population 4,414), five cases of childhood cancer were observed from 1986 to 1989 when only 0.4 cases would have been expected based on the National Cancer Institute SEER (Surveillance Epidemiology and End Results) data for Hispanics. All of the parents of these children are farmworkers and the mothers of four of the children worked in the grape vineyards during their pregnancy. (Moses, 1989)

- Children born in areas with high pesticide use are twice as likely to be born with limb reduction defects than children born in areas of minimal pesticide use. (Schwartz, 1988)

Chairman MILLER. And Barbara, I recognize you for any statement that you may have.

STATEMENT OF HON. BARBARA BOXER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mrs. BOXER. Mr. Chairman, thank you. I have just a couple of remarks to make.

First of all, I am so proud to be on your committee. And as you know, for the last couple of years, I chaired the Task Force on Health for the Budget Committee. We have had the opportunity to work together many times.

And I just want to say for the sake of the people who are here who do not know that much about the workings of Congress, that this committee—the Select Committee on Children, Youth, and Families—was founded only because of the gentleman sitting here, Mr. George Miller, who felt that children needed a voice in the Congress of the United States. And I want you to know that this committee is essentially committed to making sure that the problems of families and children are heard, all the time. That is their only focus, and their only purpose.

And being able to work with people like Pete Stark on Ways and Means, Mr. Miller has built coalitions in the Congress. And we have seen attention paid, for the first time, really, in the past few years, to the horrible trends we have seen in our society, such as children in poverty, children with AIDS, children of divorced parents, children with drug problems, the WIC program, the Head Start program. And given all the budget problems we have had, many children's initiatives have gone through the Congress, really in large part because of this committee and the leadership of George Miller.

So whenever I have a chance, I like to tell people about this committee, and the person who founded it. Because without it, we would not have a voice for children. I think that today's hearing is especially important because if we do not have healthy children, we do not have a future. And we are beginning to find out some horrible things.

I mean, this news that you alluded to, Mr. Chairman, on the second-hand smoke and the impact on kids. If parents do not immediately stop smoking in front of their children, they are harming them. And we need to get this message out. The purpose of this hearing is very important.

I will have a constituent coming forward very briefly at some point to talk about an issue we are facing in Marin County. But I really want to thank you for the privilege of being on this committee, and being with you today.

Chairman MILLER. Barbara, thank you. Pete?

STATEMENT OF HON. PETE STARK, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. STARK. Thank you, George. Mr. Chairman, I would like to commend you and your select committee for holding these hearings. And thank you for letting me participate. Because the people of the Bay area that we represent are suffering from—right now—

from all of the problems that I know your hearing today is going to illustrate to us in great detail.

I think it is important to remember that this is a political problem. Those of you, most of you in the audience, are professionals, and understand the technical aspects of what is happening. And I will look forward to your explaining that to me. And I am inclined to believe you.

But unfortunately, I do not understand most of the technical jargon that you will use. But I do understand a little bit about politics. And there are two problems.

Less than two out of every hundred industries in California have any kind of monitoring system. That means 98 businesses using, doing nothing. Two may—1.4 is the figure.

Why? Two reasons. Business will not do the right thing unless you make them. All these Boards of Directors give a hoot about is profit.

Now, that is not so bad. That is why you elect them, those of you who are stockholders. But that means that Government has to make them do the right thing. We need laws. And that brings us to the second problem.

The Republicans have spent the last 12 years dismantling regulations, processes, and turning their back on the poor, and children, and helpless, and workers who have no control over their environment.

So one, we have got to control business. Two, we have got to get rid of the Republicans. And it was illustrated this morning so grandly by the Secretary of Health and Human Services. You could have heard him on, certainly on the networks and perhaps on national public radio where I heard him, telling me that the way to get better health by the end of this century, in effect, is to exercise? Stop smoking? Be careful with sex? And that ought to turn the country's health procedures around in the next decade.

I do not believe that, Dr. Sullivan. I really believe that the Federal Government has a stronger role than just preaching the litany of Jesse Helms and Charles Atlas. We really have to go to work. And it is under the leadership of people like Barbara and Chairman Miller that we will very specifically, and unfortunately dramatically and sadly, illustrate the need for Government to do something.

For example, I would like to go back next week and put a huge excise tax on all lead. Now, I know what is going to happen. The battery manufacturers and the film manufacturers, and whoever else uses lead, are going to say, "Oh, my goodness, our business will close."

We will say, "Okay, there will be a huge tax on lead. But if you monitor, and have a safe workplace, we will give you a rebate." And I will bet you we are going to find people, more than just two out of every hundred industries will start to do the right thing.

So I need your help. I am happy to be here today, to hear where the problems are. And then in a kind of heavy-handed and crude way that often I have been accused of, I am going to go back and see if, with George and Barbara's leadership, we can make these people—business and the Republicans—do the right thing.

Thank you, Mr. Chairman.

Chairman MILLER. Thank you. I also want to thank and recognize Supervisor Don Prado who came by earlier, who has been involved with both trying to secure funding, and efforts to deal with the lead problem.

Just a side note: I can remember standing on the side of a freeway in Los Angeles at an elementary school in 1971 with George Mosconi, when we felt we were able to attack the lead problem, and draw attention to what was happening to children in schools, near freeways, and in other environments with heavy lead concentrations. And this was both a state effort and national effort.

It is kind of tragic that in 1990 we find that almost the same numbers of children are being exposed with some of the same problems. It just shows the diligence that is needed when we speak about the health of our children.

With that, let's welcome the first panel, which will be made up of Dana Hughes, who is a consultant for Children NOW, based here in Oakland. She will be accompanied by Jim Steyer, who is the President of Children NOW.

If you would come forward. Welcome to the committee. Your written statements will be placed in the record in their entirety. And you proceed in the manner in which you are most comfortable. We will ask you to summarize so there will be time for questions by the Members of the committee.

Jim, welcome; and Dana, welcome to you.

PREPARED STATEMENT OF FORTNEY H. (PETE) STARK, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

ENVIRONMENTAL TOXINS AND CHILDREN: EXPLORING THE RISKS

Mr. Chairman, I would like to commend and thank you for holding this hearing which calls attention to a very important problem in our state and in the Bay Area which we represent. The state of California and its people have been leaders in the recognition of environmental hazards which are detrimental to health and safety. It is especially important to identify the risks to our children and to protect them from preventable diseases.

An article last week in the Washington Post indicated that there are at least 2500 California children under age 17 who have potentially toxic levels of lead in their blood because they live near factories that use lead or in homes with lead-based paint. Many other children are affected by parents who carry lead home on contaminated clothing from work in such places as battery manufacturing plants, radiator repair shops and ceramic plants. Unfortunately, unborn babies are thought to be particularly susceptible to lead poisoning when their mothers are exposed to lead fumes at work.

The sad part of this story is that we have known about lead poisoning and how to prevent it for many years. These children are being needlessly exposed and suffering a preventable disease. Why does lead remain such a problem, particularly here in California where people have been environmentally sensitive?

One reason is because lead is now recognized to cause problems at levels much lower than were previously thought dangerous. Although the OSHA standard has been very successful, we now know that it must be set lower to meet our new level of knowledge. A second reason is the lack of environmental and biological monitoring in businesses where we know a hazard exists. Only 1.4 percent of lead using industries in California have biological monitoring programs for their lead-exposed workers! And finally, the standard has been inadequately enforced, with many exceptions and variances given to industry.

There are many obvious remedies to some of these problems. New standards can be set, more monitoring can be required, more control technology and respirators can be used and people can be better educated. However, I would like to propose that non-essential uses for lead be identified and eliminated. It may be advanta-

geous to impose an excise fee on lead produced in primary smelters and on all imported lead.

Again, let me thank Congressman Miller for holding these hearings, and be assured that I stand ready to take the necessary steps to prevent these needless hazards to our children.

STATEMENT OF JAMES STEYER, J.D., PRESIDENT OF CHILDREN NOW, OAKLAND, CA

Mr. STEYER. Thank you very much, Mr. Chairman, and members of the committee. Children NOW is a California-based policy and advocacy organization for kids. We act as a strong and independent voice for children in the Legislature, in the media, in the community. We are delighted to have the opportunity to present testimony on environmental toxins and children.

Before I turn it over to the author of our report that we are releasing in conjunction with the hearing today, I would like to tell you briefly the reasons why Children NOW undertook this report.

First is that, at a time when there is growing concern here in California and around the country about environmental issues, we wanted to put the spotlight on the tremendous implications for children as children when we are talking about environmental problems. Far fewer people today understand that our actions have critical and immediate consequences to the health and safety of our planet's most vulnerable and least culpable inhabitants, and that is children.

We hope our report will help point some light on that.

Second, we pay particular attention to the needs of children who are poor, or at risk, and children of color. We feel that there is a tremendous need to place greater emphasis on the consequences of environmental hazards on children in low-income neighborhoods.

And finally, we hope that we can begin a growing collaboration between children's organizations such as Children NOW and environmental organizations, to see the ways in which we can work together in two fields that have tended to be separate, to focus growing attention on this problem.

We have done that both through our Board member, Dennis Hayes, who was the Chairperson of Earth Day, 1990. And also in the work of my colleague, Dana Hughes, who worked with environmental groups around the Bay area, and the country, to help put together our report which is entitled, "What's Gotten Into Our Children?"

And with that, I would like to turn it over to Dana Hughes, who is the principal author of the report.

Chairman MILLER. Thank you.

STATEMENT OF DANA HUGHES, M.P.H., M.S., CONSULTANT, CHILDREN NOW, OAKLAND, CA

Ms. HUGHES. I would like to spend my time presenting the highlights of this report for you. But I should preface it by saying that this was a report designed for the lay public and for policymakers. And it is a non-technical report, and we relied very heavily on the work of other people who have done the primary research. And we are grateful to their work.

It has long been understood that there are health consequences of environmental hazards. A growing body of evidence also indicates that children are at elevated or special risk from environmental toxins.

But the full extent to which children are at risk is not fully known at the moment, for a number of reasons. One reason is that many of the health problems that children suffer related to environmental exposures are subtle, or invisible, at least initially, and may not be detectable for many, many years. As a result, it can be difficult to actually trace exposure to a later health problem.

The second problem as you pointed out, Mr. Chairman, is that not nearly enough research has been conducted on the relationship between children and the environment in children's health problems. The bulk of the research that has been conducted thus far has primarily looked at the implications of environmental toxins on adults, a group which face facing very, very different threats than children.

Despite these limitations to our current knowledge, we do know a number of things about special risk to children. There are at least four reasons why children are at particularly grave risk.

Children are vulnerable for physiological and physical reasons. Because children's bodies are still developing, they are more sensitive to substances that can interfere with the developmental process. Fetuses and newborns are particularly sensitive to chemicals and other toxins.

Additionally, since children are smaller than adults, the same amount of exposure to a toxin can lead to a higher concentration in their smaller bodies. And those two factors can exaggerate for children the implications of an exposure.

Secondly children's curiosity and other unique behaviors can place them at risk. It is natural, and important for children to play outdoors, to run and jump, and to explore. And yet, those very activities can place them at risk for environmental problems.

For example, because children spend a great deal of their time outdoors playing, they can breathe more air per body weight than an adult does. And that behavior itself can place them at greater risk from air pollution.

Playing outdoors can also place children at greater risk from the harmful effects of sun exposure, which can have implications for eyes and skin.

The third factor is lack of judgment that children display. Children, particularly younger children and babies, simply do not have the judgment to avoid danger. They cannot comprehend the notion of danger. For example, children are unable to understand a potential harm that can result from placing objects in their mouth. And yet young children, toddlers and babies, commonly will put paint chips in their mouth, laden with lead, which is one of the major ways in which children can be exposed to lead.

Finally, children have many more years ahead of them than adults do. So if a child is exposed to a toxic substance with a delayed effect, such as a cancer-causing material, the child can have

as long as 70 or 80 years to develop a disease in response to the exposure. And yet, an adult exposed to the same substance might have died of other causes before that toxic substance could take effect.

I want to emphasize that while all children are at risk for these problems because of the peculiar characteristics of children, it is poor children who are at greatest risk. And there are a number of reasons for this.

Poor children are more likely to be exposed to toxins because they are more likely to live in neighborhoods, and attend schools, where hazards are present. Poor families simply lack the financial resources to avoid hazards that might exist, either by removing them or by buying alternative products like organic vegetables and fruits.

Third, when a poor child is affected by an environmental hazard and develops a health problem, they are less likely to have the problem detected and treated due to poor children's greater likelihood of being uninsured.

Finally, poor children face greater risk because their families simply lack the political influence to insist that toxins in their neighborhoods be eliminated.

For the purpose of our report, we categorized the risks to children in terms of the context in which they are exposed to them. Because we are short on time, I will refer you to the report for the details of the kinds of exposures. You will have a chance later on to hear from persons much more expert than myself about what those are. In general, children's exposure can be described in terms of what they eat, where children live, where children learn, and where children play.

I would like to conclude by just emphasizing that the health threat that environmental toxins present to children, while extremely serious, are not insurmountable. The general public can play an important role by removing hazards in our immediate surroundings: in our homes, in our backyards, in our garages.

As individuals, we can have influence through the choices we make in the products we buy, and whether or not we take public transportation. Those are important steps. And yet, we also must remember that individual action alone is not going to eliminate the health threat to children from environmental exposures. To achieve lasting and far-reaching solutions, we must place responsibility on institutions, both public and private, that make decisions which affect us all and insist that they make the needs of children a priority.

Among the immediate challenges at hand that we would like to stress is, one, the need to acknowledge that children face an additional risk, and to begin to take steps to remove those hazards.

Secondly, we have to ensure that all children receive needed health care to ensure that children who are exposed to environmental toxins have the opportunity to have their problems detected and treated.

Third, we have to ensure that we no longer pollute the environment and expose children to new environmental threats.

And finally, we have to take steps to ensure that a priority is placed on research that looks at the special contribution, or the special problems that children face from environmental toxins.

Thank you very much.

[Prepared statement of Dana Hughes and James Steyer follows:]

PREPARED STATEMENT OF DANA HUGHES, M.P.H., M.S., POLICY CONSULTANT, CHILDREN NOW, AND JAMES STEYER, J.D., PRESIDENT, CHILDREN NOW

Mr. Chairman and Members of the Committee, thank you for the opportunity to present testimony on environmental toxins and children. This hearing is critical at a time of growing awareness about the need to protect and preserve the environment. While most Americans grasp the long-term implications of carelessness and indifference towards the environment, far fewer understand that our actions have critical and immediate consequences for the health and safety of the planet's most vulnerable and least culpable inhabitants: *children*.

Children Now, a non-partisan organization devoted to educating the public about the needs of children and developing effective responses to them, prepared a report for the public and policy makers on children's special vulnerabilities to environmental toxins and pollutants. This report, entitled, "What's Gotten Into Our Children?" is a synthesis of the scientific literature examining the effects of environmental exposures on children. The report is designed to inform policy makers and parents alike on the risks to children and identify steps we can take to protect them. The major findings from this report are presented below.

Why Children Are at Elevated Risk: It has been long understood that some chemicals and pollutants can cause health problems in people of all ages. A growing body of evidence indicates that children are especially sensitive to a number of substances found in the environment. However, the full extent to which children are at risk is not yet known, in part because the effects of environmental toxins are frequently subtle if not altogether invisible, at least initially. For example, the effects of cancer-causing agents, such as radon, may be undetectable for several years after exposure, making it difficult to trace the onset of the disease to the original source.

In addition, not nearly enough research as has been conducted on the effects of environmental toxins on children. Instead, the bulk of research

thus far has focused on adult populations, a group facing very different risks than children.

Despite these limitations to our current knowledge, there exists a substantial body of evidence about the health hazards that all humans face, as well as information about the special risks to children. There are at least four reasons why children are at particularly grave risk.

First, children are more vulnerable for physical reasons. Because children's bodies are still developing, they are more sensitive to substances that can interfere with the developmental process. Fetuses and newborns are especially vulnerable to damage caused by chemicals and other toxins, such as lead (Florini et al , 1990). For example, children retain as much as twice the amount of lead that they are exposed to as adults. Additionally, since children are smaller than adults, the same amount of exposure to toxins may lead to higher concentration in the smaller bodies of children. Yet most government standards are based on an average adult.

Second, children's curiosity and behavior place them at risk. It is natural and important for children to play and explore. However, such activities can place them at greater risk of exposure to environmental hazards. For example, because children spend more time outdoors playing, they breathe more air for their body weight, compared to adults. This places them at greater risk from the harmful effects of air pollution. Children are also at greater risk because they tend to eat proportionally large amounts of foods produced using pesticides, such as apples and apple juice. The Natural Resources Defense Council (NRDC) found that the average child is exposed to four times as much of eight widely-used cancer-causing pesticides in foods as the average adult (Natural Resources Defense Council, 1989).

Third, children lack the judgement to avoid danger. Unlike adults, babies and young children cannot comprehend the notion of danger. For example, young children are unable to understand the potential harm that comes from placing objects in their mouths. One of the ways in which babies

and toddlers are poisoned by lead is from putting paint chips in their mouths, a common practice because the chips taste sweet. Even older children may not fully realize the importance of being careful with dangerous materials, like toxic art supplies.

Finally, children have many more years ahead of them as adults. If a child is exposed to a toxic substance with a long delayed action, such as a cancer-causing material, the child may have as long as 70 or 80 years to develop disease in response to the exposure. An adult exposed to the same substance may have died of other causes before the toxic substance takes effect.

Risks to Poor Children: While all children are at risk for these reasons, poor children face even greater threats from environmental hazards. Because they are more likely to live in neighborhoods and attend schools where hazards are most common, poor children are more likely to be exposed. Poor families also lack the financial resources to avoid hazards by removing them or by purchasing "alternative" products, like organic fruits and vegetables. When poor children are affected by environmental hazards, they are less likely to have the health insurance and access to health care for treatment. Finally, poor children also face greater risk because their families do not have the political influence to insist on the clean-up of hazards in their neighborhoods.

Where Children Encounter Environmental Health Risks: The specific environmental risks to children can be identified in the context of where children spend their time. By looking at hazards in terms of the actual places where children will encounter them, we can more easily locate the problems at their sources and more readily find solutions. What follows is a brief summary of some of the major threats facing children and primary sources of exposure.

What Children Eat: Harmful substances in food present risks to us all, but especially to children because they eat a large amount of food for their

body size. When their food, such as fruit and vegetables, is tainted with toxins, children consume a disproportionate amount of the toxin. Moreover, as a proportion of all the food they eat, children tend to consume greater amounts of food that contain toxins, thus multiplying the potential risk. Among the chief environmental threat to children contained in what they eat include:

o *pesticides on food*, which include a wide range of agricultural chemicals used to kill rodents and insects, preserve fruit and vegetables, and improve their appearance. Pesticides are known to cause a number of serious health problems, including cancer. The Natural Resources Defense Council (NRDC) estimates that more than one half of the lifetime risk of cancer associated with pesticides on fruit is incurred before the age of six (NRDC 1989);

o *heavy metals and chemicals in fish*, normally one of the healthiest of foods, can present a health threat to children when large concentrations of the toxins are absorbed into fish.

o *contaminated water*, including chemicals, lead and other toxic substances which make their way into the water supply from improper disposal of industrial wastes, leaching from dump sites, agricultural and home use of pesticides and natural sources (Russel et al, 1987);

Where Children Live: Children spend a good part of each day at home where they eat, sleep, play and study. For most children, home is a source of security, comfort and love. But there can also be things in homes that can be harmful to children, threats that parents and others may be unaware of. Among the greatest environmental threats to children found in homes are:

o *hazardous household products*, such as most cleaning products, nail polish remover and remover, drain cleaner, anitfreeze and pesticides;

o *indoor air pollution*, from several sources, including tobacco smoke, formaldehyde (found in some types of carpeting, wallboard, panelling and insulation) and asbestos (see discussion of asbestos below) (Lioy, 1989);

o *lead*, which can cause kidney damage, anemia, hypertension and neurological and learning problems, is found in lead-based paint, leaded gasoline, drinking water pumped through lead pipes or copper plumbing with lead soldering; and food (Florini, 1990); and,

o *radon*, a by-product of decaying radium and uranium, can seep into buildings through openings in the foundation and remain there without ventilation. Prolonged exposure to high levels of radon have been demonstrated to cause cancer (American Academy of Pediatrics Committee on Environmental Hazards, 1989).

Where Children Learn: Naturally, we are all concerned about the quality of schools and day-care. Normally, we worry about the caliber of teachers, the curriculum and the extra-curricular activities. But we must also consider how safe school buildings and grounds may be. Studies have identified a number of hazards to children's health and safety in schools and day-care centers that can be prevented or removed. These include:

o *hazardous art supplies*, such as rubber cement, permanent felt tip markers, pottery glazes, enamels, spray fixatives and pre-packaged paper mache (Environmental and Occupational Health Information Program, 1989);

o *pesticides*, used on or around school grounds to kill or control unwanted insects, plants, rodents and other pests, can present a danger to the children as well when they play in areas recently sprayed or breath contaminated dust; and,

o *asbestos*, which was commonly used for fireproofing, insulation and soundproofing in schools, as well as other buildings, between the 1930s and 1970s, is associated with a number of respiratory and chronic health problems in certain forms(General Accounting Office, 1982).

Where Children Play: Children spend a large amount of time outdoors, and they should be encouraged to do so for exercise and fresh air. However, there are precautions that should be taken to avoid exposing children to hazards where they play. It is also critically important that steps be taken to prevent further pollution of the outdoors. Among the environmental threats to children present where they play are:

o *air pollution*, such as ground level ozone, which can cause serious short-term respiratory problems in children as well as long-term respiratory conditions. In 1988 alone, ozone levels in Los Angeles exceeded California's standards for safety a total of 178 days (Lipsett and Jackson, 1989);

o *harmful sun exposure*, resulting from depletion of a protective layer of gases in the stratosphere places all humans --but particularly children -- at risk of eye damage and sun burn. Studies indicate that even one serious sunburn can increase susceptibility to skin cancer;

o *dangerous play areas*, found in our neighborhoods and surrounding areas, such as construction sites and abandoned factories, present serious threats to children who play on or near them.

Reducing and Preventing Harm to Children: The health threats that environmental toxins present to children, while extremely serious, are not unsurmountable. The general public can play an important role by removing hazards in homes, backyards and garages, and by making everyday choices that are more protective of the environment, such as taking public transportation rather than driving individual cars. This involves understanding what risks children face and the ways in which we can

eliminate or reduce those risks. Children Now has prepared the report "What's Gotten Into Our Children?" to aid parents and others identify these threats.

As important as individual action is, lasting, far reaching solutions cannot be achieved by individuals alone. Instead, responsibility must be placed on institutions -- both public and private -- that make decisions affecting large numbers of people. In other words, we must *pursue policies that make the protection of children's health and well-being a priority*. Among the immediate challenges at hand are the need to acknowledge the special risks that children face and to take steps to protect children from existing hazards, such as lead, contaminated water and hazardous art supplies. Second, we must ensure that all children, regardless of their income, insurance status or parents' employment, have access to comprehensive health care to detect and treat health problems associated with environmental toxins, as well as other health problems. Third, we must take steps to prevent future exposures by reducing the introduction of additional environmental toxins. Finally, we must make a priority research that examines the special effects of environmental toxins on children, as opposed to adults.

It is our hope that the report, "What's Gotten Into Our Children?" will help to draw attention to the critical need to take these steps.

Thank you again for the opportunity to testify today.

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What's gotten into our children

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Children and the Environment: Why We Should Care

Most Americans understand the need to protect and preserve the environment. We know that further pollution and destruction of the earth will deprive future generations of clean air, water and soil necessary for survival. Despite this knowledge, we don't always act to protect the environment because these problems, as serious as they are, often seem very far way.

However, our actions also have important consequences today. They can affect the health and safety of our planet's most vulnerable residents: *children*.

Because of characteristics unique to children, they face special risks from environmental hazards. We are just beginning to understand about the number of environmental pollutants and chemicals that we once thought were harmless but actually can make children very sick. For example, asbestos was commonly used in construction because it protects against fire. We now know that certain kinds of asbestos can cause cancer when breathed. A number of other substances that were once believed to be safe, such as pesticides like Alar, and certain kinds of art supplies, are now known to be especially harmful to children.

While all children are at risk, poor children face even greater threats from environmental hazards for a number of reasons. Because they are more likely to live in neighborhoods and attend schools where hazards are most common, poor children are more likely to be exposed. Poor families also lack the financial resources to remove hazards or to purchase "alternative" products, like organic fruits and vegetables, which are usually more expensive. When poor children are affected by environmental hazards, they are less likely to have the health insurance and access to health care for treatment. Poor children also face greater risk because their

families do not have the political influence to insist on the clean-up of hazards in their neighborhoods.

Fortunately, there are steps we can take to prevent children — both poor and not — from becoming sick or injured by environmental hazards.

First, we can educate ourselves about the special risks children face, and remove hazards from our homes, garages and backyards.

Second, we can work with others, including our neighbors, PTAs, community groups, religious congregations and state and national organizations, to press school officials, governments and industry for policies and products that protect children and the environment.

Finally, by voting and becoming involved in political campaigns, we can help make sure that our legislators represent our concern for good health for children and a safe environment for us all.

This booklet gives you the information you need to make a difference. It includes information about the special environmental hazards that threaten children and steps you can take to reduce these risk and help preserve the environment.

Why children are at special risk

Pollutants and chemicals in the environment can cause health problems for people of all ages, but compared to adults, children are particularly sensitive to a number of substances. Experts in the fields of medicine, environmental science, occupational health and safety and public health agree that children are more sensitive to many environmental hazards for at least four reasons.

Children are more vulnerable for physical reasons. Because children's bodies are still developing, they are more sensitive to substances that can interfere with the development process. Fetuses and newborns are especially vulnerable to damage caused by chemicals and other toxins. Also, since children are smaller than adults, the same amount of exposure to toxins may lead to higher concentration in the smaller bodies of children. Yet most government standards for acceptable exposure levels are based on an average adult. The effects of lead poisoning on children are an important example of children's special risks. While adults absorb about 10-20 percent of the lead they are exposed to, children absorb about 50 percent. Recent studies show that even small amounts of lead in children can cause significant and persistent nervous system damage, as well as serious learning and behavioral problems.

Children's curiosity and behavior place them at risk. It is natural for children to play and explore and we encourage such behavior because it helps them to learn and develop. However, such activities can place children at greater risk of exposure to environmental hazards. For example, because children spend more time outdoors playing, they breathe more air for their body weight, as compared to adults. This places them at greater risk from the harmful effects of air pollution. Experts tell us that those at greatest risk include healthy children who exercise or play vigorously. Children are also at greater risk because they tend to eat proportionally large amounts of foods produced using pesticides, such as apples and apple juice. The Natural Resources Defense Council (NRDC) found that the average child is exposed to four times as much of eight widely-used, cancer-causing pesticides in foods as the average adult.

Children lack the judgment to avoid danger. Unlike adults, babies and young children cannot comprehend the notion of danger. One of the ways in which babies and toddlers are poisoned by lead is from putting lead paint chips in their mouths because the chips taste sweet. Even older children may not fully realize the importance of being careful with dangerous materials. Because young children often lack good judgment, it's not enough to warn them about risks or provide adult supervision. When it comes to toxins and children, the only solution is to completely remove the materials from their surroundings.

Children have many more years ahead of them than adults. If a child is exposed to a toxic substance with a long delayed action, such as a cancer-causing material, the child may have as long as 70 or 80 years to develop disease in response to the exposure. An adult exposed to the same substance may die of other causes before the toxic substance takes effect.

Just as children should not play with matches or be left home alone, children need special protection from environmental hazards even when the hazard is not a great threat to adults.

Reducing and preventing harm to children: three ways you can help

There are at least three different ways in which we can all help to reduce the risk to children from environmental hazards: steps we can take today to remove hazards in our personal environments; steps we can take with others to ensure that our schools and communities, as well as the products we buy, are safe; and steps we can take through the ballot-box to assure effective political leadership.

Personal steps we can take today. We can each act immediately to remove the hazards that may be present in homes, backyards and garages. This involves identifying and removing problems that might be present, such as hazardous cleaning products and pesticides. It also involves being aware of the implications of the everyday decisions that can affect children's health and the environment, and making choices that do not contribute further to the problem. For example, we can take public transportation whenever possible to reduce air pollution, and we can avoid purchasing household cleaning products that contain harmful chemicals. This booklet offers a number of suggestions about how we can all act to remove hazards in our immediate surroundings.

Steps we can take with others. Many of the environmental hazards facing children are beyond the ability of individuals to control. To find lasting, far-reaching solutions to environmental problems, individual action alone is not sufficient. Instead, we must work together to persuade the public and private institutions which make decisions that affect large numbers of people, such as school boards, legislatures and industry, to make decisions that consider the health and safety of children as central. There are a number of ways in which we can effectively work together for such change, like educating our neighbors and community groups, organizing letter writing campaigns and meeting with decision makers about our concerns. This booklet offers specific suggestions for such collective activity.

Steps we can take through the ballot box. Finally, we can make a difference by voting for and supporting elected officials who are committed to working to eliminate environmental hazards facing children. We all have a responsibility to ensure that our elected officials — on a local, county, state and national level — reflect our concern for a safe and healthy world.

How this report is organized

What follows is information on the special risks to children from environmental hazards. Specific risks — and remedies — are presented in the context of where children spend most of their time. By looking at hazards in the terms of the actual places where children will encounter them, we can more easily locate the problems at their source and more readily find solutions.

What children eat

Harmful substances in food present risks to us all, but especially to children because they eat a large amount of food for their body size. When their food, such as fruit and vegetables, is tainted with toxins, children consume a disproportionate amount of the toxin. Moreover, as a proportion of all the food they eat, children tend to consume greater amounts of food that contain toxins, thus multiplying the potential risk.

Pesticides on food

Pesticides include a wide range of agricultural chemicals used to kill rodents and insects, preserve fruit and vegetables, and improve their appearance. Children can be exposed to pesticides on the foods they eat. This is of concern to many because some pesticides are known to cause a number of serious health problems, including cancer. The Natural Resources Defense Council (NRDC) estimates that more than half of the lifetime risk of cancer associated with pesticides on fruit is incurred before the age of six.

Heavy metals and chemicals

Fish, one of the healthiest of foods, can be contaminated by harmful substances such as mercury and PCBs. This happens when the contaminants are dumped directly into oceans, bays and lakes or make their way there when ground water is contaminated from dump sites. Acid rain also contributes to the build-up of heavy metals in fish. The acid leaches (pulls out) metals whenever acid water contacts soil, allowing the metal to be absorbed by fish.

Contaminated water

Children can be harmed by drinking water contaminated by chemicals, lead and other toxic substances. For information about lead in drinking water, see page eight. Contaminants can make their way into the water supply from a number of sources, including improper disposal of industrial wastes, leaching from dump sites, agricultural and home use of pesticides, and natural sources. No one knows the full extent of ground water contamination, but one survey of California's large public water systems found that nearly 20% had some contamination. Contaminated drinking water can be a problem wherever children drink water: at home, school or the playground.

Personal steps you can take today

- If affordable and available, purchase organic foods. If not available, ask that your local grocer stock organic foods so you and others can buy it. This not only reduces the risk of exposure to pesticides, but supports farmers who use alternative pest management. You can have more influence than you know. After parents stopped buying apples treated with Alar, many farmers voluntarily stopped using the substance.
- Get used to the idea of buying food that is not picture perfect. Many pesticides, like Alar, are used only to improve the appearance of food.
- Conserve energy to reduce acid rain by insulating your home, using public transportation and using energy efficient appliances.
- Consider purchasing a charcoal water filter for your tapwater. While not the answer to contaminated water supply, they can filter out some potentially harmful substances.

Steps you can take with others

- Organize a letter writing campaign to the Environmental Protection Agency (401 M St. SW, Washington, D.C. 20460), the Food and Drug Administration (5600 Fishers Lane, Rockville, MD 20857) and members of Congress urging them to step up testing of produce for pesticides and to immediately ban all high risk pesticides.
- Join your community's chapter of Mothers and Others for Pesticide Limits (or organize one). For information, contact the national office of Mothers and Others at (202) 783-7800.

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- Learn if your local health department monitors the water supply for major toxic pollutants, such as nitrates, fumigants, herbicides and industrial contaminants. If not, work with others to encourage the health department to set up a monitoring process.
- If your water supply comes from groundwater, see if you are near a potential source of groundwater contamination. The Citizen's Clearinghouse for Hazardous Waste can send you a list of hazardous waste dumps in your neighborhood. (CCHW, P.O. Box 926, Arlington, VA 22216, (703) 276-7070).

To learn more

- Mothers and Others for Pesticide Limits has produced a booklet entitled "For Our Kids' Sake: How to Protect Your Child Against Pesticides in Food" which is available for $7.95 through the Natural Resources Defense Council. Call (202) 783-7800.
- Order "Drinking Water — A Community Action Guide" from Concern, Inc. 1974 Columbia Road NW, Washington, D.C. 20009.
- For more information or answers to specific questions or concerns, try these hotlines:
  Pesticide Hotline: 1-800-858-7378
  Safe Drinking Hotline: 1-800-426-4791.

Where children live

Children spend a good part of each day at home where they eat, sleep, play and study. For most children, home is a source of security, comfort and love. But there can also be things in our homes that can be harmful to children. Fortunately, we can protect children from these dangers. Just like matches, some of these things must be kept out of children's reach. In other cases, we must take steps to remove the hazards altogether.

Hazardous household products

Some items we use in our homes can be harmful to children, such as most cleaning products, nail polish and remover, drain cleaner, antifreeze and pesticides. Sometimes they are stored within children's reach, presenting a serious danger to young children and babies. If they give off dangerous fumes or residues, hazardous household products can be harmful to children (and adults) whenever used. If hazardous products are thrown away improperly (such as left in the garage), harmful chemicals can contaminate the soil and water, threatening children where they play.

Indoor air pollution

This is caused by the build-up of gases or particles inside a building. Among the major threats to children is second-hand ("passive") tobacco smoke, which can lead to respiratory problems. Another source of indoor air pollution known to cause health problems in children is formaldehyde (found in some types of carpeting, wallboard, panelling and insulation) which can cause irritation of the eyes, nose, mouth and throat, and has been shown

to cause cancer in laboratory animals at high doses. Asbestos also contributes to air pollution. For information about asbestos, see page ten.

Lead

Exposure to lead, especially in fetuses and young children, can cause kidney damage, anemia, hypertension and neurological and learning problems. Experts have learned recently that even small amounts of lead in children can be harmful. Children can be exposed to lead by breathing fumes from leaded gasoline, drinking water pumped through lead pipes (found typically in houses built during the early part of this century) or copper plumbing with lead soldering (a common practice until it was banned in 1986). Lead-based paints, found in buildings painted before the 1970 lead paint ban, also pose a threat to children if they eat paint chips or breath dust. Children can be harmed by lead even before they are born if their mothers are exposed to lead during pregnancy.

Radon

Radon is a by-product of decaying radium and uranium and is found naturally in the rock and soil of some areas of the country. Radon can become dangerous when it seeps into a building through openings in the foundation and remains there without ventilation. Prolonged exposure to high levels of radon can cause cancer.

Personal steps you can take today

- Whenever possible, use less hazardous products in your home. For example, instead of window cleaner, try vinegar and water.
- Store hazardous products in safe places out of the reach of children.
- Don't smoke where children live or visit.
- In homes last painted before 1970, the chances are good that the paint is lead-based. There are no easy answers to removing the threat from lead paint. Peeling paint should be covered up, or if necessary, removed. However, removal of paint can be hazardous for adults and children, so removal should be done by professionals who are aware of the risks involved.
- If you are renovating an older home or removing lead paint, make sure that children and pregnant women do not stay there until after the job is done.
- It's a good idea to flush out the pipes in the morning before using the water for drinking or cooking to get rid of lead and bacteria. Let the water run for at least three minutes. This is particularly important when using tap water for preparing baby formula or other foods for small babies and pregnant women.
- All children should be tested for lead levels before they are six years of age. Have a doctor test for the level of lead in your child's blood. If you have no doctor, your state health department (which is listed in the telephone book under "State Government") can help you find someone to test your child.
- Have your home tested for radon. Call your area's regional office of the Environmental Protection Agency (which is listed in the telephone book under "U.S. Government") for a list of reliable companies.

Steps you can take with others

- Work with groups like the American Academy of Pediatrics for increased funding for state and federal programs for testing and treatment of children for lead and removal of sources of lead.
- Educate others in your community (such as your congregation, PTA, child care group, civic groups) about household products that can present dangers to children. Encourage the use of alternatives.
- Help create a household hazardous waste program in your community. A guide is available through Seattle METRO at (206) 447-5875.
- Talk with the managers of your neighborhood hardware and grocery stores about stocking less hazardous products for you to buy.

To learn more

- The Golden Empire Health Planning Center has published "Making the Switch: Alternatives to Using Toxic Chemicals in the Home." It can be ordered for $5 from the Local Government Commission in California by calling (916) 448-1198.
- Greenpeace Action has a booklet on household hazards entitled "Stepping Lightly on the Earth: Everyone's Guide to Toxics in the Home." Call (202) 462-1177 for more information.
- The American Lung Association has information on indoor air pollution and makes referrals for testing. Check your telephone book for the chapter in your state or community.
- The Environmental Protection Agency and Centers for Disease Control have produced a "Citizens' Guide to Radon," available through regional EPA offices (listed in your telephone book under U.S. Government).

Where children learn

It's natural for parents to be concerned about the quality of the schools and day-care that their children attend. Parents usually worry about the caliber of teachers, the curriculum and the extra-curricular activities. But parents should also consider how safe school buildings and grounds may be. Studies have identified a number of hazards to children's health and safety in schools and day-care centers that can be prevented or removed.

Art supplies

Some art supplies that are used for fun and learning have recently been shown to cause health problems in children who use them. Harmful art supplies can include rubber cement, permanent felt tip markers, pottery glazes, enamels, spray fixatives and pre-packaged paper maché. While older children can usually use such products safely, most younger children cannot. The biggest concern of experts is that most parents and teachers don't know which products are harmless and which pose a threat.

Pesticides

Pesticides include chemicals used to kill rodents, insects and weeds. Schools frequently use pesticides on and around school grounds to protect children from animals that might carry germs and to keep play areas neat. However, government studies show that some pesticides can cause serious health problems for humans and laboratory animals. Experts believe that children may be especially sensitive to pesticides since they receive a greater dose per pound of body weight than adults when exposed. Also, children's bodies cannot dispose of

pesticides in their system as quickly as adults.

Asbestos

Asbestos is a name for a group of mineral fibers found in nature. Asbestos was commonly used for fireproofing, insulation and soundproofing in schools (as well as other buildings) between the 1930s and 1970s. We now know that breathing certain kinds of asbestos fibers can increase the chance of developing chronic diseases, including cancer. A 1986 federal law requires schools to develop and implement plans to "manage" asbestos. While it is usually not a good idea to actually remove asbestos, there are ways of containing it so that children are not exposed. Many schools have yet to meet the law's requirements.

Personal steps you can take today

- Obtain a list of hazardous art supplies from one of the groups listed below and remove dangerous supplies from your home. Share the list with friends, neighbors, teachers and schools.
- Suggest to your school's principal that she/he meet with the PTA and other parent groups about the steps being taken to make the school healthy and safe for children.

Steps you can take with others

- Organize a letter writing campaign to federal and state health officials in support of the establishment of a government registry to verify which school products and art supplies are genuinely non-toxic.
- Work with your PTA, civic group or religious congregation to make sure your local Board of Education is aware of the hazards that may be present in schools and help to develop a plan for removing them. For example:
  1) Encourage your Board of Education to adopt a plan to control insect and other pest problems without pesticides. A model school district policy regarding pesticide use, which has been adopted by a number of school districts, is available from Citizens for a Better Environment ((415) 788-0690). At the least, insist that plans for pesticide use be posted in advance and that use be restricted to periods when school is not in session.
  2) Check whether your community schools have been tested for radon and lead in drinking fountains, and if action has been taken to protect children from exposure to these hazards.
  3) Encourage your Board of Education to purchase art supplies that are proven to be safe for children.

To learn more

Information on hazardous art supplies is available from:

- U.S. Public Interest Research Group (202) 546-9707.
- Natural Resources Defense Council (NRDC), which has published a booklet for $3.95. Call (212) 949-0049.
- Environmental and Occupational Health Sciences Institute (EOHSI) has prepared a fact sheet, available in single copies for free. Write for a list of their publications at Resource Center of EOHSI, Division of Consumer Education, UMDNJ-RWJMS, Brookwood II, 45 Knightsbridge Rd., Piscataway, NJ, 08854.
- Center for Safety in the Arts has a number of materials including a list of materials approved for use by children under 12 which was prepared by the California Department of Health Services. (While still useful, the list has not been updated since 1987.) (212) 227-6220.

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Where children play

Children spend a large amount of time outdoors running, jumping and playing. They should be encouraged to play outdoors for exercise and fresh air, but there are precautions that we should take to avoid exposing children to hazards outdoors. It is also critically important that we take steps to prevent further pollution of the outdoors.

Air pollution

There are a number of kinds of air pollution that can be harmful to children. One important source is ground level ozone which can be hazardous to children when they run and play outdoors. Ozone is a colorless gas that is harmful when near ground level. In areas like Los Angeles, Denver and cities throughout the country with air pollution problems, ozone can be harmful to children when they breathe deeply during exercise. The ozone level is highest in summer, late sunny afternoons and near busy roads. In 1988 alone, ozone levels in Los Angeles exceeded California's standards for safety a total of 178 days. Studies show that air pollution can cause serious short-term respiratory problems in children (such as coughing and shortness of breath) as well as long-term respiratory conditions.

Harmful sun exposure

Because of depletion of a protective layer of gases in the stratosphere, humans — and children in particular — are increasingly susceptible to the harmful effects of the sun, including sunburns and eye damage. The sun is most harmful in the summer between 10 am and 2 pm, and not just on sunny days. Children are at special risk because they spend so much time outdoors and because they have a lifetime ahead of them to develop serious problems. Studies show that even one serious sunburn can increase susceptibility to skin cancer.

Dangerous play areas

Children are naturally curious and often play in places which may be dangerous to them, such as construction sites or abandoned factories that may contain toxic chemicals. Parents at Love Canal first learned of their toxins problem when their children came home covered with hazardous waste after playing in a nearby field.

Personal steps you can take today

- Whenever possible, take public transportation, carpool, ride a bike or walk to reduce air pollution from cars.
- Whatever a child's skin tone, sunscreen should be worn when playing outdoors for long periods of time to prevent sunburn.
- Scout out your neighborhood for potentially hazardous play areas and educate your children about the safe and unsafe places to play. Abandoned buildings and factories that are accessible to children and/or appear to contain toxic materials should be reported to your state health department (found in the telephone book under "State Government").
- Write to car manufacturers requesting that they make cars that get better mileage and contribute less air pollution.

Steps you can take with others

- Work with your school district and day-care programs to develop policies that restrict outdoor activities when health advisories or smog alerts have been issued or on summer afternoons, especially near busy streets.
- Organize a letter writing campaign to the President and members of Congress in support of stronger clean air laws and strict enforcement of current standards.
- Urge your local government to come up with a plan to promote public transportation, carpooling,

biking and walking.
- Organize with others to identify local sources of air pollution (such as a factory) and work to control them.

To learn more

- Information about how to conserve energy is available from the National Appropriate Technology Assistance Service (NATAS) funded by the U.S. Department of Energy. Their toll free number is 1-800-428-2525. (In Montana, call 1-800-428-1718.)
- For more ideas about how to prevent ozone depletion, contact the Environmental Defense Fund at (212) 505-2100.

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What is Children Now?

Children Now is a California-based children's advocacy organization. Children Now acts as a strong and consistent voice for all children, but places particular emphasis on children and families who are poor or at risk. The organization's goal is to educate the public about the needs of children and to generate increased resources for effective programs that serve them.

Through a combination of policy development, media/communications strategies and community outreach efforts, Children Now has pioneered a variety of programs designed to make children's issues a top state and national priority. All of Children's Now's efforts promote an integrated and preventive approach to investing in children, and are designed to build partnerships among policymakers, the private sector, service providers, parents and concerned volunteers.

Children Now produces innovative print and video materials that help focus attention on children and on ways to help them. In addition, Children Now issues an annual California state legislative agenda for children, serves as a media resource clearinghouse on children and family issues, and spearheads outreach efforts to alert low-income families to services and programs that exist to help them and their children.

Children Now was founded in 1988. The organization's accomplishments include The 1989 Report Card on How California Treats its Children, an increase in California state funds allocated towards preventive health screenings for low-income children, and the first ever statewide public opinion poll of California voters' attitudes towards children. Children Now has also sparked a variety of media reports about children and family issues, and works closely with service providers and advocates to increase resources for children and families.

Children Now has offices in Los Angeles, Oakland and Sacramento, California. Supporters include Apple Inc, Arco, AT & T, Gerbode, Hewlett, Irvine, Rockefeller, Rosenberg, San Francisco and Stuart Foundations.

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Children Now

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Chairman MILLER. Thank you. Obviously, in many of these instances, children need agents on their behalf. And the most readily available one is the parent. But I guess one of the questions I have is, how do you go about this education process of parents?

You know, with respect to maybe the most outstanding dangers that people identify in terms of garden sprays, and household sprays, and others that may be kept under the sink, and what-have-you. You kind of relate to not telling your children not to go near them, or you store them in some other place.

But with the more, less obvious exposures and potential for danger, how do you plan to get to parents to explain this to them? Because they are, in fact, the agents for certainly the very young children.

Ms. HUGHES. That was one of our aims of preparing this book, was to provide that kind of information in a way in which parents might confront the problems. We organized the threats that children face in terms of the context in which they are likely to be exposed so that both parents and others can begin to understand, to identify the problems and then find the solutions, removing them from the context in which they appear.

It is an ongoing process, and there are a number of people that are working around the country to inform parents about the threats that their children face. And the conference tomorrow is one more step, because pediatricians have an important role in informing parents and children about threats that exist.

I think that there is another step that we have to take, though. And that is to encourage parents to become involved in the political process, both in communities on a local level, to organize among their friends, to share information about potential threats, to work with school boards to remove hazards that exist in the schools. But also to ensure that our public representatives have made the same commitment the parents make to ensure the health and safety of their children.

Chairman MILLER. Barbara.

Mrs. BOXER. As you were talking, and as Mr. Miller was questioning you, I like the way you present your paper. It is very clear. And you are saying, "Let's follow a child around: where the child lives, where the child goes to school, where the child plays."

And some of these lend themselves to public policy, such as where the child goes to school and where the child plays in a public playground.

So it seems to me, Mr. Chairman, what we might want to see, is if there are ways coming out of this hearing, we could put together some kind of a program, maybe a model program, for grants to go to school districts to assist them in making these assessments. And an action plan so that we know things will be taken care of.

We did it with asbestos removal. The money was very slow in coming, but at least it got it started.

So I just want to thank you for your testimony. It was very clear. And it seems to me cities have got grants where we said, "Do an assessment of your playgrounds, and let us know if it is safe. And if it is not, what will it take, and how can we help?" It may be a way for the Federal Government to be the impetus in this type of a clean-up.

Thank you.

Chairman MILLER. Pete.

Mr. STARK. Mr. Chairman, I do not have any questions. I just wanted to thank Ms. Hughes and Mr. Steyer. I was particularly impressed by their focusing on risks to poorer children. And I think very dramatically pointing out that this is not a problem that children are going to solve; it is a problem that we have to solve for them.

And thanks very much for your concern and your interesting testimony.

Mr. STEYER. Thank you very much. And we hope we will be following up on this, both as Children NOW and with our colleagues among the committee, and also in the environmental movement. So thank you very much.

Chairman MILLER. Thank you. Thank you for your testimony.

The next panel will be made up of Ramona and Gonzolo Ramirez, who are farmworkers from Earlimart, California. And they will be accompanied by Ciro Cuellar, who is a member of the Earlimart Cancer Task Force in Earlimart, California, and Dr. Salvador Sandoval, who is the General Practitioner at the Childs Avenue Health Center in Merced, California, and Tomas Hill, who is the Director of the Tri-County Head Start Program in Fresno, Monterey, and San Bonito County.

Welcome to the committee. Come forward and take your seat. My understanding is that Ramona Ramirez is home with her daughter, who was also going to testify, who is suffering from tonsillitis today. So even as we speak, one of our children is ill.

But welcome to the committee. And again, your written statement will be put in the record. Whatever supporting documents you wish to provide to the committee will be made a part of the record of this hearing. And you proceed in the manner in which you are most comfortable.

How do you want to do this? Mr. Ramirez?

Mr. CUELLAR. I have to translate.

Chairman MILLER. Yes, you are going to translate, Mr. Cuellar, for him. Fine.

STATEMENT OF GONZOLO RAMIREZ, FARMWORKER, EARLIMART, CA, ACCOMPANIED BY CIRO CUELLAR, MEMBER OF EARLIMART CANCER TASK FORCE, EARLIMART, CA

[Mr. Ramirez speaking in Spanish.]

Mr. CUELLAR. I am going to translate it. So what he is saying is that he would like to suggest that, on this issue, for a lot of years nothing has been done. In the past, a lot of this came to focus, that——

Chairman MILLER. I am going to ask you to speak up, because people in the back of the room want to hear his testimony, also.

Mr. CUELLAR. Thank you. What he was trying to say was that he would like to see justice done from this issue of the pesticides.

In the past, the farmworkers have been struggling, suffering, exposed to pesticides and all kinds of toxins. So he would like to see that something could be done in this respect.

[Mr. Ramirez speaking in Spanish.]

Mr. CUELLAR. Okay, what he is saying is that you, the Congressman in Washington that oversees this, would like to see some enforcement. Because it not only affects the farmworkers, but the people that consume the fruits and vegetables that comes out of his valley.

So I think what he was trying to say is that the laws are not being enforced. And how to ensure them is by, from the County to the State level, the lack of resources or enforcement. So I think that is what he is trying to say.

[Mr. Ramirez speaking in Spanish.]

Mr. CUELLAR. First of all, he says he would like to thank God for getting—what he is trying to say in regard to his daughter. Sooner or later the truth has to come out that, the side for these chemicals and pesticides is going to come out, even though they keep saying there is not scientific evidence. Because that is one of the theories that the baby issue and the pesticides. So sooner or later, it has to come out.

[Mr. Ramirez speaking in Spanish.]

Mr. CUELLAR. He says that he blames the pesticides, in working where he worked there was four families close, who have had kids who have cancer. I have here with me a package of material that could be passed out outlining the children of——

Chairman MILLER. We have some of that. Committee members have that.

Mr. CUELLAR. Okay. In case somebody is interested in this material.

Now, going back a little bit, he also said that even though they have come forward and exposed this issue, even some of the farmworkers have been intimidated, by the employer or when they speak out on this issue. So——

[Mr. Ramirez speaking in Spanish.]

Mr. CUELLAR. He understands that the struggle is hard. And it is the little people that get the giant—I think what he is trying to say is the agri-business, or the chemical companies, which is the giant people. But with the help of you people, and the people that follow the environmental movement, and the help of God, I think it will come forward.

That is all, thank you.

Chairman MILLER. Thank you. Thank you. Dr. Sandoval?

[Prepared statement of Ramona Ramirez follows:]

PREPARED STATEMENT OF RAMONA RAMIREZ, FARMWORKER, EARLIMART, CA

My name is Ramona Ramirez.

I've lived in Earlimart since 1974 and my husband since 1976. We were married in 1977, and have both worked in the fields for the past 11 years. My husband and I work 10 hours a day to make monthly mortgage payments on our home. I work in the packing shed, packing almonds five days a week, while my husband works on a tractor in the fields six days a week.

I worked in the fields when I was eight months pregnant with daughter Natalie. During my pregnancy, working in the fields was very hard. It was very hot and very humid, with dust picking up everywhere. At lunch time, there would be no place to eat out there except underneath the grapevines. We couldn't help but breathe the chemicals used on the fields. My husband and I believe that the pesticides are the blame for our daughters illness.

When Natalie was 11 months old, she first showed signs of cancer and was diagnosed in 1986. For the past 7 months, she has been in remission from the Wilm's

tumor. Doctors at the Valley Childrens Hospital in Fresno, had to remove Natalie's left kidney because of the cancer. While Natalie was in the hospital, I quit my job to be with her, so she could also receive chemotherapy treatments. It was like a prison sometimes, Natalie would want to come home, especially when she was feeling better, but couldn't. While I stayed overnight with Natalie in the hospital, my husband would sometimes sleep in his pickup. Sometimes the doctor would let him stay with me. The hospital charges $7 per night, which is nothing if you have money, but when your in a situation like ours, then that's a lot of money.

We both thank God and are very greatful that our daughter is healthy and doing fine now.

STATEMENT OF SALVADOR SANDOVAL, M.D., FAMILY PRACTITIONER AT THE CHILDS AVENUE HEALTH CENTER; COORDINATOR OF THE LOWER WESTERN STREAM FOR THE MIGRANT CLINICIANS' NETWORK, MERCED, CA

Dr. SANDOVAL. First of all, I work in the Farmworker Clinic about 120 miles north of—about 100 miles north of Earlimart. I have been in the area for about 14 years, and as a physician, I can attest that medical training for physicians is pretty weak in the area of occupational and environmental medicine. I had to take extra courses.

Over the years, I have seen a lot of effects of pesticides, mainly on adults. What affects the adults is going to affect children. And I will give a few examples of that.

I have seen problems from acute poisonings to skin problems; asthma that I believe was induced by the chemicals; pneumonia; peripheral neuropathies, that is a problem with the nerves in the feet and the arms; Parkinson's Disease; heart disease; and neurobehavioral effects that I feel were——

Chairman MILLER. We need you to speak right into that microphone.

Dr. SANDOVAL. Okay. Over the 14 years that I have lived in the area, I have been concerned about—we have heard of contamination of water in several of the towns. And also we have seen increased concern about food residues with pesticides.

Some of this is not still very well clarified, in terms of the health effects.

Specifically, in terms of children, I have seen issues that have concerned me. For example, three years ago there was a spraying of a town about six miles from where our clinic is. And there were 300 people evacuated; about 30 people went to the hospital locally with symptoms. They were not tested, although the name of the chemical was available to the emergency facility.

We saw, in our clinic, three different families, including children, seven to 10 days later. Tested them, and they still showed effects of the chemical. This had been called mass hysteria officially in the local newspaper. One of the children was admitted with pneumonia. The child had asthma before the incident. But the timing of the pneumonia was about a few days after the spill.

And we heard of one child that was a newborn, that had been brought home, and developed seizures shortly afterwards and was sent to a tertiary care center. She was not examined by us.

I see often families that complain—not necessarily farmworkers, either—they complain of symptoms after spraying. And this includes children. The problems are not just with the chemicals. I

have seen people with effects related to heat. For example, one little girl that had heat stroke, and developed seizures. Since then, I have become concerned because there are not really enough child care facilities for farmworkers.

Last year, in a town not too far from us, there were about 100 families that were living in orchards, because migrant housing was not available. And I would be concerned about what exposures they can get there, besides just from the heat.

Last year, in one of our clinics, a child was born with anophthalmia. That is the absence of eyes. Both parents were farmworkers; they had migrated from the Imperial Valley.

Although it is difficult to prove causal relations, the nurses anecdotally remarked that they had seen more anencephalic babies—that is babies born without heads—and other birth deformities than usual.

Another small town, where one of our satellite clinics is, has experienced a high number of miscarriages in the past. This included the clinic staff who lived in the area. This was reported, but nothing has come of the investigation so far.

Another one of our satellite clinics also has yearly notices of large number of asthmatic exacerbations when cotton defoliants are sprayed. And the latest example is, this one is—I just saw this man about two weeks ago. He came to me because he had cancer. He was turned away by the local hospital, because they thought he was undocumented.

It turned out that he was not undocumented, but he was dying of disseminated cancer. His cancer had been diagnosed while he was in Mexico, having taken his wife, who was in her thirties, who had just died of cancer. And he is in his forties.

They lived on a farm, on a dairy farm, about an hour away from where I worked. I am concerned about their three children.

One camp close to our clinic also had a case of lead poisoning. I guess the camps had been painted with lead-base paint donated by the Navy. And in another town, people had been left homeless basically because the panelling that was going to be done was not done until the camps opened. So that contributed to the 100 families that were living in the orchards.

There are also a lot of traumatic injuries. A 17-year-old was killed about six weeks ago, and his boss was severely mauled, when first the 17-year-old was sucked into an irrigation canal turbine, and then the boss tried to save him.

At least once every three years we hear of farmworkers, or farmers' children, that are killed or severely injured on tractors.

Okay. I may be raising more questions than I am answering by talking to you here today. But I feel that it is important to look at it broadly. There are chemicals that are affecting the environment, and the workers. These are compounded by poverty, lack of housing.

Education of the children suffers, for example, when they have to work to help their families out.

Thank you.

[Prepared statement of Salvador Sandoval, M.D., follows:]

PREPARED STATEMENT OF SALVADOR SANDOVAL, M.D., GENERAL PRACTITIONER AT THE CHILDS AVENUE HEALTH CENTER; COORDINATOR OF THE LOWER WESTERN STREAM FOR THE MIGRANT CLINICIANS' NETWORK, MERCED, CA

I am a Family Practice physician with 14 years experience working with farmworkers and other rural poor in the Central San Joaquin Valley of California. I work for a federally and state funded migrant and community health center, the Merced-Stanislaus Health Clinics. Additionally, I am the current lower West Coast Migrant Stream Coordinator for the Migrant Clinician's Network.

I have taken extra postgraduate medical training in occupational medicine because of experiences in dealing with farmworkers and food-processing workers.

Over the years I have treated illnesses and injuries of farmworkers, their families, and nonfarmworkers effected by pesticide drift. In addition to the injuries I have seen acute organophosphate poisonings, chemical dermatitis, chemically induced asthma, chemical pneumonitis, pesticide related peripheral neuropathies, Parkinson's disease, cardiomyopathy, neurobehavioral changes, and other diseases states that I have suspected were chemically induced. I have viewed with alarm developments such as groundwater contamination by chemicals, the development of cancer clusters in several valley towns, talk of reintroducing the short handle hoe in California agriculture, and concerns over pesticide residues in food.

Specifically in regards to children, I will relate the following situations:

1. In a case of an organophosphate (guthion) pesticide drift from a peach orchard into a residential area 300 people were evacuated in June of 1987. They were allowed back into their homes after about 2 hours. 30 people subsequently went to a local emergency room. None were treated, and the case was dismissed as "mass hysteria". Subsequently we saw 3 different families, including children. Several of them tested positive (i.e. had depressed cholinesterase levels which subsequently rose back towards baseline). One child was admitted with pneumonia. Through one of the families we heard of a newborn infant that developed seizures shortly after being brought home in the affected area, and had to be transferred out to a specialized center.

2. This past month a mother and her son who both have asthma, experienced increased shortness of breath after an adjacent orchard was sprayed. Symptoms subsided after several hours.

3. A young girl and her brother played in and around the family car on a hot summer day while the parents worked in the field. The girl began to vomit, was felt to be hot, and was rushed to the hospital when she began to have seizures. The parents were told that she had suffered heat stroke. To this day she is "mentally slow" according to the parents. Increasingly I hear of farmworker families that are having to take their children with them to the fields because there are no childcare centers. And in Patterson, California 100 families lived in orchards because migrant housing was unavailable for them.

4. Last year a child was born with anophthalmia (absence of eyes). The mother had received prenatal care in one of our outlying satellite clinics. Both parents worked out in the field, and had migrated from

the Imperial Valley where they also work in farmlabor. Although it is difficult to prove any causal relation, obstetrical nurses had commented that there had been more anencephalics and other birth deformities than usual.

5. The small farm town where one of our satellite clinics is located experienced a high number of miscarriages, including from among some of the clinic staff who lived in the area--right about the time that aerial spraying was taking place. Although this was reported, nothing to date has come from the investigation.

6. Another small town where a satellite clinic is located experiences a large number of asthmatic exacerbations when cotton defoliants are sprayed.

7. Although this is also hard to prove, and is being investigated: I recently saw a man who had been turned away from the county clinic because he was thought to be undocumented. It turned out that he wasn't. But he was dying from disseminated cancer. His cancer had just been diagnosed while he was in Mexico to bury his wife who had just died of cancer. She was in her 30's. He is in his early 40's. They both lived on a farm with their three children, where he worked in the dairy. I fear for his three children.

8. In a farmworker camp close to our clinic a child from a family that migrates every year from Mexico had lead poisoning diagnosed. It turns out that California camps had been painted in the 1970's with paint donated from the Navy with lead base. The child had come with the family to the camp for several years before concern was raised and the children were tested.

9. The county where I work is not exempt from the traumatic injuries that occur in other parts of the country. Recently a 17 year old farmlaborer was killed and his boss severely mauled when first he was sucked into an irrigation canal turbine, and then his boss tried to extricate him. Also, at least once every three years we hear of farmer's children that are killed or severely injured on tractors.

From what I can assess from the situation, farmworker children, like their families lack basic necessities such as safe, adequate housing, basic sanitation that is enforced, and childcare facilities. Children labor in the fields (as recent DOL raids have shown), and they are there because their parents don't make enough money. As a consequence, their education suffers, let alone often times their health.

Certainly, children in farmlabor should be covered by the same legislation that should protect children in other industry. For example, nowhere else are children at such a young age supposed to work around heavy machinery, dangerous chemicals, and hazardous environments.

But equally disturbing is what we do not know as yet. The cancer risk, the teratogen risk, and other long term effects have been suspected but hard to prove. Only recently have tumor registries and birth defects registries been started in the San Joaquin Valley, and then only in certain counties. Also, it is only this year that universal reporting for agricultural chemicals was instituted in California. Hopefully we will know more soon. Certainly these measures should be made available nationally.

Chairman MILLER. Thank you very much. Mr. Hill?

STATEMENT OF THOMAS HILL, DIRECTOR, TRI-COUNTY (MIGRANT) HEAD START OF FRESNO, MONTEREY, AND SAN BONITO COUNTIES, FRESNO, CA

Mr. HILL. I run the Head Start Program in the three counties of Fresno, Monterey, and San Bonito. And we work directly with farmworker families.

In our program alone, we service about 600 families per year. And during that time, we see all matters of problems that the families have. And especially—usually we do not see a lot of the problems the families have, except through the children. Because we serve the children, we are able to help the families.

But all the things that Mr. Cuellar, and Mr. Ramirez, and Dr. Sandoval talked about, we see in Fresno County, and Monterey County, and elsewhere.

I was involved with the McFarland cancer cause from when it first began. And the things that we saw there were outrageous. Some of the children with swelled heads, water in the brain, and things like that. It is awful. Birth defects, different kinds of things that chemicals—the way chemicals affect the system, the body.

Our families are affected by the fact that they work in the fields. We try to educate our families to, when they come home from work, that they wash their clothes, wash themselves, before they handle the children. But, you know, it is very difficult to do that. You cannot be there every day, and you cannot be helping them all the time.

And invariably, they will not—they will hold the children before they clean themselves. And that, you know, that hurts our children extremely. We have seen a lot of cases where you have to take the children to the hospital for either burns on their skin, blisters on the skin, different things that are caused by the chemicals. And we know it is caused by chemicals when we asked the doctor, you know, "What would cause this kind of an injury?" They say, "Well, I think it is chemical poisoning," or you know, chemical burn, or that kind of a thing.

We have a center that is located directly across from a field. And every year, we have a battle with a farmer who wants to spray. This year, we won the battle. By that I mean that the farmer could not spray until we were able to close down our center.

But he wanted to spray, and say, you know, "Can you close down your center for three or four days while I spray our field?" And I had to contact the Department of Agriculture. And they said he could not spray while the children were there, he could not spray. And, "We will call him and we will talk to him." So the Department of Agriculture helped us in that regard.

And, you know, some other times, we have not called, and he would have probably sprayed, and the children would have been exposed to it.

As I was driving up from Fresno just today, off Interstate Five, in the Valley we could see a cropduster spraying a field. And I thought it was kind of like an omen, because I am coming to this kind of thing.

And if you could see the spraying. It was not even—it did not seem like he was landing, or three-fourths of the spray, or whatever it was, was not even landing on the crops or the field that he was spraying. It seemed to be drifting with the wind. And it is going to be drifting, you know, to people's homes, to the farmer's home, to other places where people are located at. And invariably, people are going to get sick because of that.

Some of our State Legislators have said—especially the ones from the Valley—say that they do not believe that there is any poison on the crops and things like that. And I would like to challenge them to drink a cup of a chemical that they put into each one of these sprayers, drink a cup of that in front of the Capitol steps. And if they do not die, it is safe, you know. [Laughter.]

But every time I see one of these cans that is labelled "toxic," toxic to me means poison. And you see the skull and crossbones. Whenever you teach children that that is danger, you know, that is death, that is poison, stay away from that. And all these cans have that skull and crossbones on each one of the cans. So that is poison. And to me, everybody is getting poisoned.

And it is not restricted to the fields any more, and to the farmlands. In Fresno alone, they have closed 15 wells in the City of Fresno because of contamination.

In the City of Clovis, a suburb of Fresno, they have closed six wells already.

My child—my two children—have to go to elementary school drinking bottled water because they had to close a well that serviced that school, and the area there. And this has been about eight years that they had to drink bottled water.

And some schools do not even get the bottled water. I recall one of the elementary schools, they were asking for, the parents were asking for bottled water for the children. And they had bottled water in the teachers' lounge, and in the principal's office, but they did not have any bottled water for the children.

So those are the kinds of things that we see. Every time, if you hear Mr. Ramirez talking about the things that he is talking about, and Dr. Sandoval, you may be shocked, but that is happening every day. Here in the Valley, in California, and I am sure it is happening in every agricultural area in this country.

And until we do something about it, some local communities, you know, stonewall it because they are afraid. You know, their tax base is built on agriculture and these other things. And I think, you know, you cannot blame them for being afraid. But it is going to have to come from the Federal Government, and you are going to have to help us out. Because we are going to have to have intervention from other sources.

And if you have any questions, I am willing to answer whatever I can.

[Prepared statement of Thomas Hill follows:]

PREPARED STATEMENT OF THOMAS R. HILL, EXECUTIVE DIRECTOR, TRI-COUNTY MIGRANT HEAD START, FRESNO, CA

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Tri-County Migrant Head Start

I. Narrative/Overview

Since its inception in 1965, Head Start has provided education, social, medical, dental, nutrition and mental health services for over eleven million children and their families across the nation. Specifically, Head Start's efforts are designed and directed at breaking the "cycle of poverty" through family oriented, comprehensive, and community based programs, which focus upon "developmental goals" of children; employment and self-sufficiency goals for adults and support for parents in their work and child rearing roles. Further more, Head Start is based upon the premise that "all children" share certain needs and that children of "low-income families" in particular, can benefit from a "comprehensive developmental program" to meet those needs.

In Fresno and Monterey Counties, Tri-County Migrant Head Start provides educational and support services specifically to "migrant children and families" at nine 99) different Head Start centers located in the rural areas: seven (7) of which are located in Fresno County and two (2) in Monterey County, and are as follows:

Tri-County Migrant Head Start Centers

A. Fresno County

- Parlier
- Firebaugh
- Selma
- Del Rey
- Five Points
- Huron

B. Monterey County

- San Jerardo
- Soledad

Currently, approximately five-hundred "migrant" families are receiving Head Start educational and support services. However, as of this writing efforts are underway to expand the "scope of services" currently offered, from five-hundred to "one-thousand migrant families" participating in Head Start.

A recent Needs Assessment Survey conducted by Tri-County Migrant Head Start (1984) of 217 migrant farmworker households, indicated that average family unit size was 5.39 and yearly income was approximately $9,267 per family unit, well below standard poverty levels for a family averaging 5.39 members per unit.

As "rural migrants", employment typically consists of agricultural manual types of labor usually "seasonal" in nature. Suffice it to say agriculture, is the San Joaquin Valleys number one source of income and as "historically has been the case", Hispanics usually comprise "all" or a "significant percentage of the workforce", required to harvest the agricultural crops.

II. Statement of Problem

According to research, approximately "375,000 tons of pesticide" are spread on America's farmland every year, however, less than one-tenth of one percent actually reaches a pest. The other 99.9 percent is contaminating our soil, our water, our food supply - as well as "imperiling the health and safety" of "farmworkers and the general public". It is estimated that chronic poisoning accounts for an estimated 20,000 cancer cases annually from pesticide residues on food alone. Environmental damage is severe and long-lasting, affecting both plants and wildlife and the integrity of our soil which may prove to be irreversible.

The USDA estimates that fifty million Americans drink from water sources that may be contaminated by "toxic agricultural chemicals".

Each year in the U.S. approximately 550,000 tons of pesticides, including insecticides, herbicides, and fungicides are used. Approximately, 70% of that is used in "agriculture". Result 62% of the crops land in the country is treated. Research indicates that "less than a thousandth" (.1%) of pesticides applied "actually reaches a pest". Of the 750 million pounds of pesticides applied annually to crops the greatest portion is free to move into our water and food supplies, funding its way to our tissues, liver and nervous systems. As a result of "high chemical agriculture", the following outcomes have occurred:

- Acute poisoning incidents causing 200 deaths and roughly 3000 people hospitalized annually;
- As many as 20,000 cancer cases a year from chronic exposure to residues in food for the entire national population;
- Shortened life expectancies for farmworkers due to occupational toxic exposure;
- Sterility, birth defects, and other unquantified health problems resulting form chronic exposures to chemicals on the farm and in residual amounts in food and drinking water; and
- A threat of contamination of the water supplies;

The side effects of pesticides happen quickly; farmworkers ingest, absorb, or inhale "massive amounts" in accidents and because many poisonings are "not reported" to health authorities, by both farmers and farmworkers, and because "pesticide poisoning is easily misdiagnosed, "the incidence of pesticide poisoning is not know for sure. Estimates range form 45,000 to 300,000 people poisoned each year. However, one thing for certain is that one of the most important consequences of all of this "chronic exposure to agricultural chemical", is a large number of cancer cases. As of October 1989, the EPA considered 53 active ingredients in pesticides used on foods to be "tumor producing". However, the EPA has sufficient testing data on only 289 out of the 700 "actual ingredients" currently used in pesticides, but if further tests are conducted many of these "untested ingredients " will be likely to be found harmful as well.

B. California

None of the 717 pesticides now used in California meets current safety testing requirements on birth defects, cancer, sterility and other diseases according to State reports. Furthermore, pesticide companies have failed to submit 97% of the critical health and safety studies necessary to evaluate such pesticide hazards only 12 of the 717 pesticides (1.7%) meet current testing requirements for birth defects.

C. Annual Pesticide Illness

According to the California Department of Food and Agriculture, these were 2,118 reported cases of illness in 1988 with a possible relationship to pesticide use. Of these case, 874 involved use of "agricultural pesticides", and the remainder non-agricultural uses. The number of illnesses among "field workers" due to agricultural pesticide usage, has averaged 345 over a six year period from 1982 thorough 1987. In 1988, a total of 3,144 reports were received, of which 2,118 were "classified" related to "pesticide expose".

D. Typologies of Acute Pesticide Illness

Typologies of Acute Pesticide Illnesses include the following:

Occupational - primarily dermal contact
a. Concentrated materials; mixer, loaders, applicators, manufacturing workers.

b. Residues: "fieldworkers", harvest workers
1. Epidemic Crew poisonings
2. Other

Farmworkers/harvest crew "exposure to pesticides" is usually "short-term" at "very high-levels" of exposure. Whereas, rural residents not occupationally exposed suffer "long-term/low-level exposure". (California Occupational Health Program Data, March, 1990).

E. Workforce Profile

According to a "profile of California farmworkers", Hispanics comprise approximately 88% of the workforce with 39% being of "migrant status". Average number of "weeks worked per year" for males was 25 weeks, 16 weeks for "females" and "8 weeks" for "children" (14-17).

However, as frequently is the case, many migrant families typically take the "entire family" to work in the fields. And it is not "unordinary" to see a woman in her fourth to fifty month of pregnancy working in the field.

Children typically accompany the parents to the fields, "due to the lack of child care services" available to them. A recent survey by Tri-County of 217 individual migrant families indicate that if child care services were available to them, that both parents would continue working.

In California, the highest level of agricultural pesticides usage, has occurred in Fresno, Monterey, and San Joaquin Counties, two counties which fall under Tri-County Head Starts jurisdiction i.e., Fresno/Monterey counties. (See appendix A). Accordingly, the highest physician reports of Occupational Pesticide Illnesses in California com from our service areas of Monterey and Fresno Counties (see appendix B).

In 1988, with respect to pesticide illness by crop (in Calif.), grapes reported the highest number of cases N=36. (see appendix C) Again, farmworkers typically "harvesting this crop", consisting mostly of Hispanics.

From 1980 to 1984, Fresno County has been in the top four counties in California with the highest numbers in total poisoning (see appendix D). Typically, causes of "field residue poisoning" is either (1) misapplication of pesticide or (2) "reentry interval is inadequate". (see appendix E).

III. Conclusionary Remarks

In conclusion, children of migrant farmworkers are exposed directly and in-directly to environmental toxins. Specifically without education and awareness, farmworker parents do not realize that when they come home to their families, they "run the risk"of exposing their children to toxic contaminants which have been absorbed by their clothes and skin.

Proximity or location of migrant families in the rural areas, further contributes to exposure. Camps and or houses on many occasions have been exposed to pesticides sprayed by low-flying "crop-dusters.

Pesticides have been linked not only to cancer, but, long-term exposure adversely effects the lungs, central nervous system, cell metabolism, and other vital parts of the human body. (see appendix F) If our children are to succeed and have a fighting chance at "breaking the cycle of poverty", through education, it requires that cognitive developmental abilities be at its' fullest potential. How can you explain to an innocent child in poverty, whose dreams are to learn more and more each day, that society has failed to fulfill its' responsibility in providing an environment conducive to cognitive development. Do we explain that previous generations were so engrossed with being "number one" economically, that we failed to thoroughly research the possible negative consequences resulting from saturating the soil, water, and earths natural resources with contaminants such as toxic pesticides? To this committee, concerned citizens, and distinguished guests, these children are our future leaders of America. Collectively we must each do our part within our own spheres of influence, to provide our children with the most effective tools, opportunities and capabilities with which to lead our nation. Collectively, we can make a difference.

2. By County: Fresno, Kern, San Joaquin, Monterey, Merced, Tulare account for nearly 50% of reported usage

Tons of Pesticides Reported Used, California, 1987

Total = 42,676 tons (93.5 million pounds)

Source: California Dept. of Food and Agriculture. Pesticide Use Report. 1/4/89

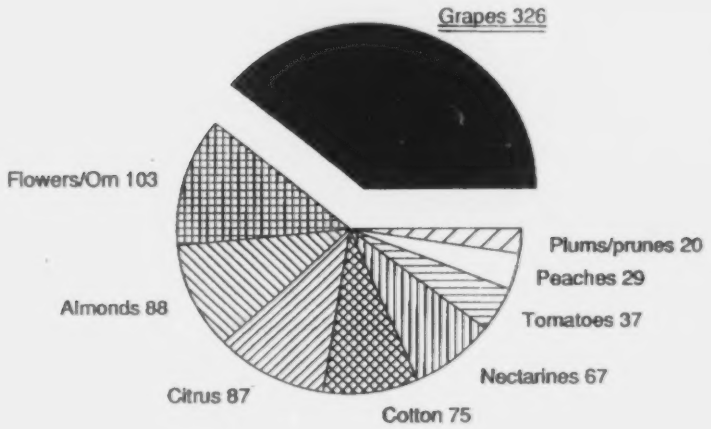
APPENDIX B

Physician Reports of Occupational Pesticide Illness, California, 1987

Total Reports = 1507

Source: California Dept. of Food and Agriculture, HS-1489, September 27, 1988

1988 M.D. Illness Reports in Calif.
Top 10 Crops



CDFA

APPENDIX 5

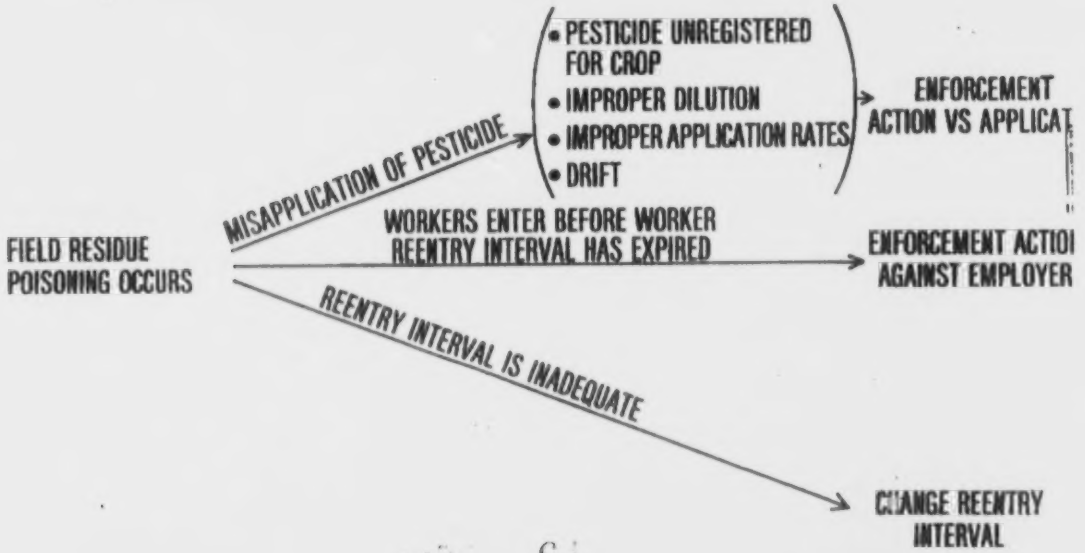
RANKINGS AND NUMBERS OF KERN, TULARE, AND FRESNO COUNTIES, AMONG ALL COUNTIES IN TOTAL POISONINGS (AGRICULTURE RELATED)

APPENDIX D

	1980	1981	1982	1983	1984
KERN	1st (272)	1st (209)	1st (156)	1st (205)	1st (198)
TULARE	4th (56)	2nd (61)	2nd (150)	2nd (109)	4th (50)
FRESNO	2nd (114)	3rd (60)	4th (72)	4th (92)	2nd (92)
Total and % of Statewide Agriculture	934 47%	613 54%	901 42%	406 47%	340 45%

Sources: Various CDFA reports

CAUSES OF FIELD RESIDUE POISONING CASES


FIELD RESIDUE POISONING OCCURS
MISAPPLICATION OF PESTICIDE
• PESTICIDE UNREGISTERED FOR CROP
• IMPROPER DILUTION
• IMPROPER APPLICATION RATES
• DRIFT
ENFORCEMENT ACTION VS APPLICAT
WORKERS ENTER BEFORE WORKER REENTRY INTERVAL HAS EXPIRED
ENFORCEMENT ACTIOI AGAINST EMPLOYER
REENTRY INTERVAL IS INADEQUATE
CHANGE REENTRY INTERVAL

APPENDIX F

California Occupational Health Program

4. Selected Acute and Delayed Health Effects Not due to Cholinesterase Inhibition

Organ	Effects	Pesticide (eg.)
CNS	Seizures CNS depression behavioral changes psychologic reaction	organochlorines halothanes OPs, CS_2 various pesticides
Lungs	pulmonary edema pulmonary fibrosis	methyl bromide paraquat
Peripheral nerves	nerve cell death	methyl bromide methamidiphos
Cell Metabolism	uncouple cell respiration	dinitrophenol
Blood	hemorrhage	anti-coagulant rodenticides
Skin	Contact and allergic dermatitis, corrosive effects	strong acids and bases
Eyes, mucosa, URT	irritation	many
Well being	nuisance, odors	mercaptans, DEF

Chairman MILLER. Well, thank you very much. Going back to the original panel's notion of exposures of children to sort of where they live, where they play, and for older children where they might work. Mr. Hill, I guess, to what extent—it would seem to me when you talk of children living in the fields, and you talk of families having to live in orchards, or living in close proximity to fields that are being sprayed, the children that come to your Head Start Center, the migrant children and others. They live in an environment where their exposures are much more consistent, I guess, over time, than children in other settings we might expect.

And you mentioned, do you see the kinds of chemical burns and rashes on children in your clinic that Mr. Hill has talked about, Dr. Sandoval?

Dr. SANDOVAL. I have heard of and seen more exposure from secondary exposure. When the chemical is brought home like on the work clothes of parents.

Then I have heard of children eating the fruit, which really worries me, when they are in the field because they do not have a child care center available.

Many families will not take in their children with just skin problems, because they are concerned about the cost. And that is part of the reason we may not see them, unless they are more severe.

Chairman MILLER. Mr. Cuellar, what is the Earlimart Cancer Task Force?

Mr. CUELLAR. Right now, you mean at this stage now?

Chairman MILLER. Yes, you are doing that.

STATEMENT OF CIRO CUELLAR, MEMBER OF EARLIMART CANCER TASK FORCE, EARLIMART, CA

Mr. CUELLAR. Well, right now what we are trying to do is to get the State to see if we can get some funding to put a screening clinic. They went ahead and applied the questionnaire, so they would do a survey, a questionnaire direct to the families. But what we wanted was to get the State to put a screening clinic like they did in McFarland.

The one in McFarland, they did do no good, because they spent $136,000. And even though they were in the final stage of the report, we had young children who were like those, a month later, with a tumor in the stomach.

So what we are saying is that, even though the kind of a test that they did, they did not do an efficient testing of the children. And the kid went to the clinic, and they misdiagnosed. He had a tumor about the size of a pinball, you know, a small pinball.

But anyway, what we are asking right now is, I kind of, I do not know if you have a copy of the factors I will stress at this hearing. Family needs is identification of victims on an immediate basis; actively assisting enough with these in identifying the financial and social services. That is what we would like to see.

And this family is going through a lot of hardship because, as you understand, like Mr. Ramirez, there is a family here, Caldillo right now, he is in a real financial bind right now. That he cannot cover his hospital cost.

And Medicare does not want to cover a lot of the medicines that these kids are required to take. So not only they are having that kind of problem, but when you have that they have to drop out of the job to take care of the kids, children, it is real hard on them.

And we try to get the County to kind of—we were having parents from Tulare County going into Kern County to get Medicare over there, because the County was not doing the job in assisting these families.

So that is one of the things that we are looking at and would like to see.

Community needs include the importance of educating the community for free cancer screening service, the importance of identifying causes of cancer. Demand an evaluation of occupation in cancer studies; identify the relative risk index for occupation of agriculture; and create a grass roots agency that would serve as a task force of committees and affiliated medical facilities, such as the United Health Services for areas.

[Prepared statement of Ciro Cuellar follows:]

PREPARED STATEMENT OF CIRO CUELLAR, MEMBER OF EARLIMART CANCER TASK FORCE, EARLIMART, CA

My name is Ciro Cuellar.

I am currently a member of the Earlimart Cancer Task Force. The reason for my membership is because I would like to see the families whose children who are stricken with the cancer, be assisted for their needs. The Earlimart Cancer Task Force was formed by the Earlimart Town Council Task Force.

In the summer of 1984, Henry Rodriquez and I, both members of the Mexican American Political Association at that time, assisted the McFarland residents bringing their attention of the unknown cancer cluster. In June of 1984, myself, along with Henry Rodriquez requested a hearing which was conducted in the McFarland area, by Senator Art Torres, requesting that the county conduct an investigation into the childhood cancer cluster. During such time, the cancer out-break continued among children and adults alike. Residents continued to be diagnosed with brain tumors and other health problems.

In September of 1989, a childhood cancer cluster was discovered in Earlimart. Six children have been diagnosed with cancer. One child died of complications related to leukemia.

At the request of the Earlimart Cancer Task Force, the state agreed to translate a detailed 50-page questionnaire into spanish and given copies to the families in advance, so they would be able to prepare themselves to answer questions asked by the investigators.

Chairman MILLER. Mr. Sandoval, how common is it for pregnant women to continue to work in the fields late into their pregnancy? In your practice, and maybe among the parents in the Head Start Program, if you have particular knowledge of that.

Dr. SANDOVAL. I see quite a few that have to do that. And they would prefer not to. Some stop working because it is just physically too demanding.

For example, with the——

Chairman MILLER. They would stop working, at what period, though?

Dr. SANDOVAL. Well, when they start feeling uncomfortable is when a lot of them stop. We have helped some stop earlier and try to get disability benefits earlier than they would have, because the work is physically demanding.

For example, hoeing puts a lot of strain on the back, and on the abdomen, also. There have been some studies that show that that

type of work is associated with premature births, and also some stillborns.

Chairman MILLER. Mr. Hill?

Mr. HILL. Well, we have seen some—in fact, our Health Coordinator was talking to us yesterday about a woman who was pregnant, eight months pregnant. And she had just come out of the fields.

And she went to a clinic, and was not rendered services because she did not have $24 to pay for the initial first visit.

It is not rare to see women working up to the sixth month, seventh month. And that is because the family needs her help. It is a matter of economics. It is not a matter of whether they know that they should not work or not. It is a matter of economics. The family does not have enough money to have the services, and the food, and you know, the necessities of life that they need.

I would like to just say a little bit more about what Mr. Cuellar was alluding to. Some of the reportings in the Valley have been very small because, due to the fact that screening centers have not been set up to check on, specifically pesticide poisonings, or cancer, or any of these kinds of things.

In Kern County, they had a real problem trying to get any information about reportings of cancer findings, findings of cancer in children and those kinds of things, because they did not have a screening center or a testing center in any of the hospitals. They would have to send them to Fresno County, because Fresno County had a screening center. And that would take, you know, I mean, people just did not have the time or the money to be able to travel all the way to Fresno to have their children tested or, you know, diagnosed.

So a lot of the reportings in Kern County, Tulare County, and these other areas, are very misleading, because there was not enough screening and testing centers to do the screenings.

Chairman MILLER. Congresswoman Boxer?

Mrs. BOXER. Dr. Sandoval, are you collecting numbers on the number of birth defects, and the number of cancers among young children? Do you have statistics?

Dr. SANDOVAL. There is a tumor registry and birth defects registry that was set up in some of the counties in the San Joaquin Valley. They have been there for about a year-and-a-half.

So far, their officials reports are that the number of tumors are not any larger than in urban areas. The thing is, these registries I think list—some of them list only deaths. I think they do not list all the incidents of cancers.

Many cases, I think, in the Valley were missed because they were being reported like from the Bay area, or to Los Angeles, where the families end up going for specialized care.

Mrs. BOXER. So you feel that the statistics are inaccurate and do not reflect reality.

Dr. SANDOVAL. That is true. I feel we need more time. Unfortunately, these were not set up long enough ago. And I think it is limited in the number of counties. I think the birth defect registry just covers seven counties.

Mrs. BOXER. Mr. Cuellar, do you know what a farmworker earns an hour now?

Mr. CUELLAR. Well, some farmworkers, $4.25 an hour, which is the State minimum wage. And some other—it depends, also, on what kind of job they do. They are seasonal jobs, which they work so many months of the year. Like right now is the harvest season.

And workers that work a permanent job, that do some other type besides harvesting crops, like an irrigated tractor driver, the most he would make, we are talking about $12,000 a year. At the most. So we are talking roughly around $250 a week. That is gross. Deductions leaves you somewhere around $179, $180 a week.

Now, farmworkers, the majority of the farmworkers in the State of California are not covered by insurance. Very few farmworkers have medical insurance that is provided by the employer.

Now, it is my understanding right now, there is very few workers under union contract, which provide that kind of a benefit. So when you have an incident like, let's say Mr. Ramirez and this other family, it is very hard for them to make it on $12,000 a year to take care of this kind of problem.

And I think one of the things that needs to be stressed and pushed for in the Federal level, is to push for medical insurance for farmworkers. I understand, I mean Kennedy was kind of pushing in that direction. So I would like to see something done in that respect.

There is about 250,000 in the State of California.

Mrs. BOXER. So Mr. Ramirez, when he was faced with his daughter having cancer, and she had to have her kidney removed, he had no health insurance? He had to mortgage his house, is what I understand.

Mr. CUELLAR. Right, right. And one of them had to stop working to take care of the——

Mrs. BOXER. Right. So their income was cut in half. They had to mortgage their home to take care of this child.

Mr. CUELLAR. To take care of the daughter, yes. And you have most of all these families, that this is just the Earlimart. We have some more in McFarland. It has even come to the point of all these families, after the son died, they could not have enough money to bury them. So that is another one right there.

And you know, when these farmworkers are the ones that produce the food served at the table, and there is the lowest pay, no benefits, you know, I think there is something wrong with this country. So, I would like to see something more done in that respect.

Mrs. BOXER. There is something wrong here, exactly right.

I have one last question. Mr. Hill, you said that—let me make sure I understood. Am I right in saying that there is no law that would prohibit the spraying of an area which was located right next to, or adjacent to, a school, such as Head Start? As far as you know, there is not any law? You had to call and make a plea to the Agricultural Commissioner on that?

Mr. HILL. As far as I know, there is not. But you know, there could be, but I am not sure. And we have to call the Agricultural Commissioner to, you know, to prevent the farmer from doing that.

See, we also receive monies from the State Department of Education for, as reimbursement for our children for meals. And every time you have to close the center, it costs us money to feed the

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children. And that was what we were talking to the farmer about. But he needs to spray his field, and——

Mrs. BOXER. So the center is right on the field, essentially.

Mr. HILL. It is not on the field; it is right across the street.

Mrs. BOXER. Okay. It is interesting, because the uproar in the State over the Malathion spraying, which is, in most cases, a one-time occurrence. And here you are in a situation where you are probably getting the spray constantly.

Mr. HILL. It is constant. And it is——

Mrs. BOXER. Where you live, where you work, where you go to school. All those places where children are getting the spray.

Mr. HILL. And you know, it is hard to express how dangerous it is. You can see the children, and I talk to them every day. But, you know, children have no way of knowing what is happening to them.

And even the families, sometimes they do not understand that this is very toxic, and it can really damage them. And it is not that they are ignorant; it is just that they do not know what is being sprayed in the fields, and what they are dealing with.

And we try to do as best we can. Mr. Cuellar, his efforts in McFarland and Earlimart, I know they have tried to educate the farmworker as much as possible about the dangers. But until there is enough money spent on this, and enough intervention, we are not going to be able to resolve this problem.

Mr. Cuellar was saying about, was talking about how much a farmworker family makes. We made a study, conducted a study on our families that participate in our program. And the average income was $9,267 a year. The family unit was 5.39 members per family. That is way below the poverty level, poverty line.

And our families, they do not want to ask for any kind of help, or sometimes are afraid to ask for help. So they work for them. And they are always working, and they are very proud of what they do, and they are very proud of what kind of work that they do.

But, you know, it is very difficult to really live adequately with this kind of an income.

Mrs. BOXER. Well, to have $9,000 and have, over that, the worry, fear, and sickness, sounds like a nightmare.

I do have one last question, only to Mr. Cuellar. And that is, out of the farmworkers that you come in contact with, what percentage are guest workers? In other words, they just come in from Mexico, and then they go back.

Mr. CUELLAR. My understanding, just roughly figured that we gather through the people that applied for amnesty, from Fresno all the way down to Bakersfield, which is a large area. We estimated—we found of the people that applied at that time, it was 800,000 people that applied for amnesty.

Now, in regard to farmworkers, just in this area, location that I come from, we are talking about 12,000 workers in just that area. So you are looking to like Maleno, Earlimart, and McFarland, we are talking about several thousand workers. They come and they leave.

Mrs. BOXER. They come and they leave, and they really are not part of the political pressure that you are trying to put to this issue.

Mr. CUELLAR. Right, right. And the ones that stay, which a lot of them have their families here, they brought the families in and try to enroll them in school. Right now, we are overcrowding our schools. We are trying to get some more funding to expand our area, which is a growth.

One of the other areas that is growing in our area, I see the Governor is putting a lot of money in the prisons. So like south of the Valley, from Fresno way down to where I come from, there is a lot of prisons to be built up. So that is going to create another growth for more people in that area.

But I do not see any money coming toward the needs of what we need in our area. And the workers, they come, they stay about five or six months out of the year here, and then they go back. But something has to be done, because child care, and lunches, and stuff like that, you know, like I been reading all that, you know, they are talking about cutting here and cutting there. And a lot of these families cannot afford, you know, to take care of the needs of these children.

Like Thomas Hill was saying right now, the survey they did. There is families, they got more than five kids, you know. You very rarely find families of three in a family, or four. But if you have large families, and a lot of these people, farmworkers, sometimes they put the kids to work, because that is the only way they are going to, you know, make ends meet.

Mrs. BOXER. Thank you.

Chairman MILLER. Mr. Stark?

Mr. STARK. Thank you, Mr. Chairman. Dr. Sandoval, the concerns that you raised deal with direct exposure to these chemicals and pesticides, and not to exposure through residual amounts on fruit that you might buy in the supermarket. I mean, you are concerned with the commercial applications and the exposure to these chemicals as they may occur by being near the fields, or having equipment that is contaminated with them, and not the residual effects. Is that correct?

Dr. SANDOVAL. Well, the largest exposure is to the people working in the fields. The exposure, there has seen a lot of publicity about the contamination of food. And there is a lot of controversy on that.

I am concerned about that, too. I think what affects the consumer affects also the farmworker. We have to look at the issue broadly.

Mr. STARK. Well, that is what I was going to get at. I would like Mr. Cuellar to perhaps translate for me a little bit. We will hear later today that we are too concerned about residues on food, and after all, a witness will tell us later that the protection against cancer by eating a lot of fruits and vegetables outweighs any effects of pesticide residues. So we ought to use a lot of pesticides, because we will have more fruit and vegetables for the rich kids up in Piedmont. And then they can all avoid cancer.

What I would like to ask Mr. Ramirez is, if he would be happy to see one of his children get sick from these pesticides so that kids in

the city who are well-to-do can avoid cancer. Does he think that is worth seeing his children be sick?

[Mr. Cuellar and Mr. Ramirez converse in Spanish.]

Mr. CUELLAR. Going back to your question, he says that if he would have to put his life on the line to save his daughter, and some other children, he would do it. But he said, you know, in his respect, that is not fair.

Mr. STARK. All right. And I could not agree with him more, you tell him. But I think that is the position we get ourselves in here, is that while it might be nice to have Safeway and Lucky's just groaning with attractive produce, there is a very severe social cost to the people who grow that fruit, and harvest it, and work in those industries.

I am sorry that this gets turned around. I apologize for those of us who enjoy healthy food, because it is just not worth any child being sick to produce it for us. And I want to ask you to thank Mr. Ramirez for his help.

And Dr. Sandoval, thank you for the work you are doing. Thank the witnesses very much. Thank you, Mr. Chairman.

Chairman MILLER. Thank you. And I want to thank this panel for their participation. I am sorry we were not able to hear from Natalie and her mother, Ramona, but they have their own health problems right now.

I think what is clear is that the choices as outlined by Congressman Stark and by others is that we ought not to continue a system that subsidizes relatively inexpensive food in our supermarkets by the poor health, and working conditions, and the environment of the people who are responsible for harvesting that food.

This committee has tried to make sure that we have allotted time over our years of existence to deal with special populations, and migrants are one of those populations in all regions of the country that we have tried to address. And the tragedy is that they continue to subsidize the price of food with their poor health, with the death of their children, and the maiming of members of their family in the field and elsewhere, in the harvest of that crops. And not very much has, in fact, changed from the 1940s to the 1990s.

We have fits and spurts about treating farmworkers with some dignity, and providing health facilities, and just the ability to go to the bathroom in privacy. And yet all of those are resisted, essentially, by the various farm employer organizations.

With respect to toxins, it is a population that causes us very, very special concern, because of the constant, ongoing exposure within their total daily environment. I spent many years working with families of asbestos victims. And there again, we saw in many instances the danger posed by asbestos brought home on the Levis of the workers, and to the members of the family in that household, as asbestos dust just continued to build up inside those houses, and eventually struck down members of the families that were not, in fact, employed in the industry.

So the issues you raise here today are of very serious concern to us. And we will continue to follow up on them.

And Mr. Ramirez, thank you very much for your testimony. And I hope that Natalie is feeling better, and I hope that she continues to experience recovery from her cancer.

Thank you very much.

STATEMENT OF KATHLEEN ISRAEL, PARENT AND CO-CHAIRPERSON, CONCERNED RESIDENTS OF MARIN COUNTY (CRMC), SAN RAFAEL, CA

Ms. ISRAEL. Good morning, and thank you for this special opportunity.

Chairman MILLER. Speak right into the microphone, or no one will hear what you have to say.

Ms. ISRAEL. Can you hear me now?

Mrs. BOXER. Just talk louder.

Chairman MILLER. Just talk louder, and speak up, and relax and enjoy yourself. Come on.

Ms. ISRAEL. My name is Kathleen Israel, and this is my story. I am a mother of a child who attended Davidson Middle School in San Rafael. I have two other children, and I am the co-chairperson for the Concerned——

Chairman MILLER. Into the mike.

Ms. ISRAEL. I am sorry.

Chairman MILLER. You have to speak up.

Ms. ISRAEL. Residents of Marin County. I believe that my child was exposed to a variety of hazardous chemicals while attending his school last year. These chemicals emanated from the PG&E-Lindaro Street Dumpsite in San Rafael, and are listed in Exhibit 1.

The PG&E-Lindaro Street is approximately 900 feet upwind to the north of Davidson Middle School. And this dumpsite was formerly occupied by a coal gasification facility from 1875 to 1960.

My concerns for my child are both the potential for the development of cancer in the future, as well as his immediate health problems, which include fatigue, severe headaches, irritability, confusion, and loss of concentration.

My concerns are for all children and families who are exposed to toxic chemicals from abandoned coal gasification sites, both in California and all throughout the United States.

The PG&E-Lindaro Street Dumpsite has buried subterranean coal gasification waste products, which included approximately 1,200,000,000 pounds of lampblack and/or coke; approximately 10 million gallons of coal tars, including polynuclear aromatic hydrocarbons, or PNAs; and approximately 30 million gallons of by-product, including benzene, toluene, xylenes, and other light hydrocarbons.

Please formulate and implement an effective policy that directs the U.S. Army Corps of Engineers to clean up this site and other dumpsites, with technologies that are safe, effective, and utilize on-site recoveries of these waste products so they can be recycled and used as chemical feedstocks.

And I would just like to add these. To emphasize that it is very important to inform the educators regarding the effects of toxics so they can take the responsibility in educating the parents and the children. And I would like to ask you to please help us with the future for our children.

[Prepared statement of Kathleen Israel follows:]

PREPARED STATEMENT OF KATHLEEN ISRAEL—A PARENT AND CO-CHAIRPERSON, CONCERNED RESIDENTS OF MARIN COUNTY (CRMC), SAN RAFAEL, CA

My name is Kathleen Israel and I am a mother of a child who attended Davidson Middle School in San Rafael; I have two other children I also am the co-chairperson for the Concerned Residents of Marin County (CRMC). I believe that my child was exposed to a variety of hazardous chemicals while attending his school last year. These chemicals emanated from the PG&E - Lindaro Street Dumpsite in San Rafael and are listed in EXHIBIT ONE; the PG&E - Lindaro Street Dumpsite is approximately nine hundred feet upwind, to the north, of Davidson Middle School. This Dumpsite was formerly occupied by a coal gasification facility from 1875 to 1960.

My concerns for my child are both the potential for the development of cancer in the future as well as his immediate health problems which include: fatigue, severe headaches, irritability, confusion, and loss of concentration.

My broader concerns are for :

A. Cancer Outcomes

B. Fetal-toxic Outcomes

C. Geno-toxic Outcomes

D. Childhood Development Outcomes

E. Immuno-toxic Outcomes

F. Neuro-endocrine (functional and behavioral)

G. and all other Adverse Health Effects (including but not limited to Multiple Chemical Sensitivities (MSC) Volatile Organics Syndrome (VOS) and Systemic Toxic Heavy Metal Poisoning),

in all children and families who are exposed to these types of toxic chemicals from abandoned coal gasification sites both in California and all throughout the United States.

The PG&E - Lindaro Street Dumpsite has buried subterranean, coal gasification waste products which included:

1) approximately 1,200,000,000 pounds of lampblack and or "coke

2) approximately 10,000,000 gallons of coal tars including polynuclear aromatic hydrocarbons (PNA's)

3) approximately 30,000,000 gallons of by- product including benzene, toluene, xylenes, and other light hydrocarbons.

(EXHITIT TWO gives the estimates of the amounts of these waste products during the lifetime of the PG&E coal gasification facility's operation from 1875 to 1930. This facility produced approximately ten billion cubic feet of coal gas during this period.)

Please formulate and implement an effective policy that directs the U.S. Army Corps of Engineers to clean-up this and other dumpsites with technologies that are safe, effective and utilize on-site recoveries of these waste products so they can be recycled and used as chemical feedstocks.

Thank you for your kind attention.

Kathleen Israel

EXHIBIT ONE

Summary of Hazardous Chemical Data from PGE Facility -- San Rafael, CA, Sites 1 and 2 (Studies from August 15, 1984 through September 1989)

I. Inorganics - Soil

A. Toxic Heavy Metals

1. Arsenic - up to 12 ppm[4].
2. Chromium - up to 130 ppm[4].
3. Lead - up to 320 ppm[4].
4. Nickel - up to 170 ppm[4].

II. Organics - Soil

A. Polynuclear Aromatics -- up to 33,000 ppm. in the soil (BH-40) and up to 2.065 ppm. in the groundwater[3]

1. Acenapthene - up to 2,000 ppm[1].
2. Acenapthylene - up to 770 ppm[1].
3. Anthracene - up to 4,800 ppm[1].
4. Benz (a) Anthracene - up to 1,200 ppm[1].
5. Benz (b, k) Fluoranthrene - up to 1,400 ppm[1].
6. Benz (g, h, i) Perylene - up to 1,500 ppm[6].
7. Benz (a) Pyrene - up to 2,000 ppm[1].
8. Chrysene - up to 1,000 ppm[4].
9. Dibenzo (a, b) Anthracene - up to 190 ppm[3].
10. Fluoranthrene - up to 6,500 ppm[1].
11. Fluorene - up to 9,600 ppm[6].
12. Indeno (1, 2, 3, c, d) Pyrene - up to 1,200 ppm[1].
13. Naphthalene - up to 13,000 ppm[1].
14. Phenanthrene - up to 9,000 ppm[6].
15. Pyrene - up to 9,000 ppm[6].

B. Polychlorinated Biphenyls

1. PCB 1254 - up to 282 ppb. (depth of 3.5 ft.)[7]
2. PCB's (unspecified) - up to 40 ppb. (depth of 16 ft.)[8]

EXHIBIT ONE

C. Volatile Aromatic Hydrocarbons - BTXE's

1. Benzene - up to 8,300 ppb[5].
2. Ethyl Benzene - up to 1,700 ppb[5].
3. Toluene - up to 16,000 ppb[5].
4. Xylenes - up to 14,200 ppb[5].

D. Volatile Chlorinated Hydrocarbons

1. Methylene chloride - not quantified
2. Trichloroethylene - not quantified

E. Bis (2-ethylhexyl) Phthalate - up to 22 ppm[7].

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2. ibid. Table 2. (Samples from 11/2 to 11/5/82). January 7, 1983. Warren C. Steele (sig.).

3. Canonie Engineers. Preliminary Remedial Action Design - San Rafael Service Center. Final Report. Project WC 84-113-03. Table 2. June 1985.

4. Pacific Gas and Electric Company. Field Test, Report 402. 331-89.34. Table 3, page 8. September 26, 1989, Jeff Bachhuber (sig.).

5. Department of Health & Human Services, Memorandum. August 14, 1990, page 2 (VOC's). Brenda Kay Edmonds and Scott v. Wright (sig.).

6. Harding Lawson Associates. Final Risk Appraisal. City of San Rafael Retail Project. Volume II. Table 4-6a. wk1. June 21, 1989.

7. Pacific Gas and Electric Company. Letter to Mr. Dave Zappetini. March 21, 1986 H.M. Howl (sig.).

8. Harding Lawson Associates, Risk Appraisal - San Rafael Retail Project. A7883-H page 33 of 119. March 29, 1989.

7.2

EXHIBIT TWO

Horizontal retort - Yield was 10,000 cu. ft. per ton of coal from - Encyclopedia Brittanica

10,000,000,000 cu ft. of gas from 1875 to 1930

1,000,000 tons of coal was processed to produce 10 billion cu.ft. of gas.

1,000,000 tons
2000 lbs per ton
2,000,000,000 lbs of coal was used from 1875 to 1930

Coke -	*1,400,000,000 lbs*
Tars -	*10,000,000 gallons*
Liquors -	*30,000,000 gallons*
Pitch -	*6,130,000 gallons*
Creosote -	*1,300,000 gallons*
Carbolic oil -	*1,210,000 gallons*
Light oils -	*940,000 gallons*
Crude Naptha -	*260,000 gallons*

Totals

400,000,000 ft^3	*-*	*1890 to 1906*
183,300,000 ft^3	*-*	*1906 to 1908*
1,410,360,000 ft^3	*-*	*1908 to 1922*
2,688,000,000 ft^3	*-*	*1922 to 1925*
9,125,000,000 ft^3	*-*	*1925 to 1930*
13,716,660,000 ft^3		*Total gas production from 1890 to 1930*

Chairman MILLER. Thank you. Congresswoman Boxer?

Mrs. BOXER. Yes. I want to thank you very much for being very succinct and to the point, and to let you know something you may not know. Yesterday I was speaking to the Federal Officials. They are involved in this site, as you know. And I was not happy at the pace at which the study was moving forward.

We have a meeting set up; it is being set up as we speak, within the next three weeks, where we are getting all the State Agency people together, and all the Federal Agency people together, in an effort to move this study on a very fast track. And we will keep you informed. But they are——

Ms. ISRAEL. Thank you very much.

Mrs. BOXER [continuing]. Very concerned and involved.

Ms. ISRAEL. Thank you very much.

Chairman MILLER. Thank you.

Mrs. BOXER. Thank you again.

Chairman MILLER. The next panel that the committee will hear from will be made up of Dr. Richard Jackson, who is the Chief of Hazard Identification and Risk Assessment Branch of the California Department of Health Services; Dr. Cynthia Bearer, who is the Director, Division of Pediatric Environmental Health at Children's Hospital, Oakland; Dr. Lynn Goldman, who is the Chief of Environmental Epidemiology and Toxicology Branch of the California Department of Health Services; Dr. Thomas Jukes, who is at the Department of Biophysics, University of California at Berkeley; and Lawrie Mott, who is the Senior Scientist, Natural Resources Defense Council in San Francisco.

Welcome to the committee. Again, your written statements and supporting documents will be put in the record in their entirety. And you proceed in the manner in which you are most comfortable.

And Dr. Jackson, we will begin with you.

STATEMENT OF RICHARD J. JACKSON, M.D., M.P.H., F.A.A.P., CHIEF OF THE HAZARD IDENTIFICATION AND RISK ASSESSMENT BRANCH OF THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES, CHAIRMAN OF THE AMERICAN ACADEMY OF PEDIATRICS COMMITTEE ON ENVIRONMENTAL HEALTH, SACRAMENTO, CA

Dr. JACKSON. Good morning, and thank you. I am Richard Jackson. I am a pediatrician with further training in epidemiology and preventive medicine, and have had extensive experience in environmental health, especially in the area of pesticides.

I am Chairman of the American Academy of Pediatrics Committee on Environmental Hazards. I am also head of the Risk Assessment Branch of the California Health Department.

I am here today to represent the American Academy of Pediatrics, an organization of 39,000 pediatricians interested in the welfare, and dedicated to the well-being of, children.

I am grateful to speak to the committee today, and I have three basic messages. One is that we adults are short-term tenants of this planet, and we owe our children and their children a home, a

planet at least as healthful, beautiful, and diverse as the one we are given.

The second comment is somewhat more negative, which is that I believe that many environmental policy questions pivot around children. And yet children are inadequately valued in the decision process about environmental hazards.

And that number three, prevention strategies, which pediatricians are well-versed in in the area of immunization or safety issues, are slow to be incorporated into medicine. But I think we are making some real progress, and I want to talk a little bit about that as I get further along.

On the first issue of providing future generations with a planet as healthful, beautiful, and diverse as the one we were given: I realize that is self-evident, and yet we Americans frequently trade off the quality of our environment for resource development and commercial expansion.

It is often thought that the protection of our environment is antipathetic to economic development, but it is not. A healthful, diverse, beautiful environment is an economic resource and major California industries, such as real estate, agriculture, and tourism, are closely linked to environmental quality.

On the second issue of environmental decisions revolving around children, and yet children being inadequately valued, I want to give a couple of examples.

The first is a chemical that we have all heard about on "60 Minutes." It is called Daminozide, or Alar. It is a growth regulator, used on apples. It is a hydrazine compound, one of a class of chemicals well known to be carcinogens.

It was first licensed for use in 1963. And it is a systemic chemical—it gets into the stems, the fruit, the leaves; you cannot wash it off.

From 1963 on, research continued. National Cancer Institute, the Air Force, other agencies investigated this compound, and the family of compounds, and found it to be a carcinogen. In fact, the Air Force for years regulated UDMH, the breakdown product, as a carcinogen.

In 1986, the Academy of Pediatrics was so concerned about this that the President of the Academy wrote to the then head of the Environmental Protection Agency, Lee Thomas, expressing the Academy of Pediatrics' concern about continued use of this product on apples, primarily because kids eat so much apple products: twenty-two times the amount an adult does on the weight basis.

And also because cancer exposures early in life bring about longer lifetime risks, larger lifetime risks.

EPA really failed to act in a health-protective manner. And I think there were a couple of reasons for this, one of which was that EPA had no public health, no child health input into a whole advisory process that they had set up on pesticides.

What they did was recommend that further studies be done. And so another four years elapsed while further studies were done on Daminozide. And in four years, the studies came in with a high rate of tumors on the test animals, mice and rats, that were exposed to UDMH, the breakdown product.

And so after four years, the EPA then got around to regulating and removing that chemical from apple products.

Basically, children were exposed to an additional four years of unnecessary carcinogen. We certainly had apples and apple juice long before Daminozide. And there was no reason the EPA had to wait that long. And in fact, they were responsible for the chaos in the marketplace that resulted in 1989, over the revelation of this chemical throughout the apple supply.

The second example of an environmental chemical, which I think presents unacceptable risks to children and to other consumers, is the pesticide Aldicarb. Aldicarb is used on many crops to control insects, and other crop-destroying pests. It is very effective. It is extremely toxic. It is systemic, and it lasts a long time.

When I say it is toxic, the LD-50 is about a milligram per kilo, which makes it about 1,000 times more toxic than malathion, the chemical that people were so concerned about in Southern California. It is an extremely toxic chemical.

Its first breakdown product is just about as toxic, and it is the chemical that resides in food and underground water supplies that are contaminated with Aldicarb.

You cannot wash it off. It is systemic; it stays in the food. And because it works so well, it has been the subject of misuse, chemical misuse.

In 1985, it was improperly used on watermelons, and more than 1,000 people were made ill in this state. Dr. Goldman and I participated in an investigation of this outbreak, and amongst other things, discovered that the chemical was even more toxic in the population than was predicted by the company's small studies using about a dozen of its own employees, and dosing them up with the chemicals.

And it is durable, as I said. It lasts a long time.

Chairman MILLER. Where do you get one of these jobs? [Laughter.]

Dr. JACKSON. I do not know if they could pay you enough.

Aldicarb has contaminated underground aquifers, particularly shallow, sandy areas, such as the potato-growing areas in Long Island, Wisconsin, and actually some of the bulb-growing areas in Northern California. It remains in the groundwater for long periods of time. They stopped using Aldicarb in Long Island more than 15 years ago, and they have still got it in their groundwater there.

It is extremely toxic. And the symptoms of illness—headache, nausea, vomiting, diarrhea, excess salivation, excess urination—you can imagine trying to distinguish a baby, 18 months, with those symptoms from a baby with summertime flu. It is very hard to discriminate those symptoms from other causes of illness.

And because it is applied as a granular formulation, basically pumpers of the stuff, it looks like fertilizer that you are putting out, you have areas where you will get foci, or large amounts of it, and areas that will not get it. And if you were harvesting potatoes, you are going to have hot potatoes and cold potatoes from that harvest.

The EPA ordered the company to go out and sample these potatoes. They found that one of the potatoes had a level high enough—actually it was one-tenth of the LD-50. In other words, a child that

sat down and ate one of these potatoes would be within ten-fold of the dose that would have killed half the test animal population.

The EPA said they were going to suspend the use on potatoes. The company said they would temporarily suspend it. And we are now in the process of battle over this. And I have attached to my testimony a letter that I wrote on behalf of the Academy of Pediatrics, basically urging that it not be used on a number of food products, particularly potatoes. It is also found in bananas and other food products.

The Academy of Sciences, National Academy of Sciences, under direction from you folks, the Congress, have instituted a study looking at pesticides in the diet of children. That is due for release next year, and I suspect it is going to have major ramifications on the use of these chemicals.

There are many other examples where children are at the pivot of environmental decision-making. I will not go through them. But there is some good news.

For example, if you take the ozone standard, the ambient ozone standard, the smog standard. Ozone causes bronchospasm, wheezing, asthma symptoms in children. And as a result of this research into children, when the California Air Resources Board dropped the allowable level, or the standard for ozone contamination to .09 parts per million, which is considerably less—it is about 30 percent less—than the EPA standard. And you know, obviously it means that Los Angeles is in violation of the air standard even more often. But it also is going to drive a lot of decisions about pollution, pollution control throughout the State, and ultimately around the nation.

I would be available to discuss many of these pesticide issues. It is something I have dealt with for a long time.

I have just a very brief third point, if I may, which is that we, as pediatricians, have been very concerned about prevention for a long time. We have worked hard, in terms of environmental tobacco smoke, getting information to parents, reducing smoking—efforts to reduce smoking amongst kids, reduce environmental hazards in terms of bicycle and auto trauma.

We have a project looking at workplace hazards in children, which, believe it or not, is a rather considerable issue. There are a lot of kids in the workplace around the country. And as Dr. Sandoval pointed out, when you do not have child care, and you are a farm worker, your kids go out to the field with you. And that is certainly an issue as well, in California.

And Dr. Goldman will be talking about lead hazards.

Thanks to both efforts by the Centers for Disease Control, and the Agency for Toxic Substances and Disease Registries, there will be a two-day training, Kids and the Environment, for physicians, nurse-practitioners, for the next two days.

I mention this because, basically this is unprecedented. There is no such document like this; no compendium to inform physicians. I went through my entire training, and frankly, I was never even told to ask, when I interviewed a family, what the mother and father did for a living. I mean, that is how primitive the training was in terms of occupational and environmental health. And I think we have got to take steps to improve that.

And one way to do it is to train the trainers. There are too many clinics and physicians out there to train everyone personally, but if we can train people to get information out, it is an important first step.

I will stop at that point, and welcome questions. And thank you for the opportunity to appear.

[Prepared statement of Richard J. Jackson, M.D., follows:]

PREPARED STATEMENT OF RICHARD J. JACKSON, M.D., M.P.H., F.A.A.P., CHIEF OF THE HAZARD IDENTIFICATION AND RISK ASSESSMENT BRANCH OF THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES, CHAIRMAN OF THE AMERICAN ACADEMY OF PEDIATRICS, COMMITTEE ON ENVIRONMENTAL HEALTH, SACRAMENTO, CA

Good Morning. I am Dr. Richard J. Jackson. I am a pediatrician with further training in epidemiology and preventive medicine. I have had extensive experience in environmental health, especially in the area of environmental toxicology including pesticides, and in epidemiology including reproductive hazards. I am Chairman of the American Academy of Pediatrics Committee on Environmental Hazards and am Chief of the Hazard Identification and Risk Assessment Branch within the California Department of Health Services (CDHS).

I am very grateful to have the opportunity to speak to the Select Committee today and I wish to deliver three essential messages regarding children and the environment.

1. We adults are short term tenants on the planet: we need to be much more concerned about the world we will leave our children. We owe them a planet at least as healthful, beautiful and diverse as the one we were given.

2. Many environmental policy questions pivot around children, yet children are inadequately valued in most environmental decision processes.

3. Prevention strategies, while slow to be adopted within much of medicine, are intrinsic to pediatrics (for example immunization and safety issues). Concern about the environment, both present and future, is increasingly being recognized in pediatrics as a profound aspect of prevention.

On the first issue of providing future generations with a planet as healthful, beautiful and diverse as the one that we were given: this is self-evident, yet in our efforts to provide our children with a better world we Americans sometimes trade off the quality of our environment for resource development and commercial expansion. A much longer view of well-being and stewardship is needed. I understand the Iroquois Indians decided on the acceptability of a project depending on their estimate of its impact on the next seven generations.

It is often thought that protection of the environment is antipathetic to economic development -- it is not. A healthful, diverse, and beautiful environment is an economic resource. Major California industries such as real estate, agriculture and tourism are closely linked to the environmental quality of the region. To an extent,

California's phenomenal growth, more than 5 million in the decade, is related to the environmental desirability and quality of the State.

On the second issue that many environmental decisions revolve around children and that children are inadequately valued in the process, I will give some examples. Perhaps the most egregious was the decision regarding the use of daminozide, or Alar, the growth regulator in apples. Daminozide is a hydrazine compound, one from a class of chemicals well known to be carcinogens, that was first licensed for use on foods in 1963. This systemic pesticide (it permeates the roots, stems, leaves and fruit of plants) enhanced apple production and extended apple shelf life. Over the next twenty years the research world developed much evidence showing the major breakdown product of daminozide, UDMH, to be a carcinogen. In 1985, the president of the American Academy of Pediatrics wrote to the then head of the Environmental Protection Agency (EPA) expressing pediatricians' concern about the continued use of daminozide in food products destined for children. Yet the EPA failed to remove the registration, the license for sale of the product, even though apple products were major constituents of children's diets (as much as 22 times what an adult would consume on a weight basis), and although exposures to cancer-causing agents early in life carry greater lifetime risks than late exposures. EPA's failure to act in a health protective manner was due, in part, to a lack of good public or child health input in decisions regarding risks to children. On the EPA advisory committee that met to evaluate daminozide in 1985 there was no one with child health expertise, no one with public health training or focus. Clearly children were shortchanged in this advisory committee's recommendation to allow continued sale of the product until ironclad proof was provided that the UDMH was a cancer-causing agent, at which time in 1989 daminozide was removed from sale. The consumer fear and economic chaos for the apple industry that occurred with daminozide could have been prevented in 1985 with an orderly phasing out of daminozide. If EPA had acted in concert with the Academy's request, children would have been spared four or more years of exposure to an involuntary and unnecessary hazard.

A second example of an environmental chemical which I think presents an unacceptable risk to children and other consumers is the pesticide aldicarb. Aldicarb is used on many crops to control insects and other crop destroying pests. It is very effective: it is extremely toxic, it is systemic, and it is durable. When I say it is toxic: the LD_{50} is about 1 mg per kilogram body weight, which means it is approximately 1000 times as powerful as malathion. A drop of the concentrated material would be lethal to a child. Being systemic, like daminozide it penetrates the entire plant and cannot be washed off. Because of these characteristics, aldicarb has been misused: the most dramatic episode occurring here in California, where more than 1000 people were made ill from eating watermelons illegally contaminated with the chemical. Our investigation of that episode led to the discovery that the threshold for aldicarb's toxic effects was even lower than that predicted by the study the manufacturer performed when it dosed its own volunteer employees with the chemical.

Aldicarb has contaminated underground aquifers, particularly in shallow sandy areas, such as the potato growing areas of Long Island and Wisconsin. It remains in ground water for long periods of time; the contamination discovered in Long Island in the early 1970's continues today, despite local cessation of use of the product.

Aldicarb is acutely toxic, the symptoms of illness come on quickly. These symptoms, which include headache, nausea, vomiting, diarrhea, excess urination, visual and other neurological symptoms, are extremely difficult to distinguish from other signs of childhood illness. Because aldicarb is applied to a field by mixing a granular formulation into the soil, it is inevitable that some potatoes in a field would be found to have high levels of the compound. Under plausible worst case estimates, a child eating one contaminated potato could be exposed to a dose that was one tenth the dose adequate to kill one half of a test animal population -- clearly an inadequate margin of safety. The Academy of Pediatrics Committee on Environmental Hazards has expressed its concern about the hazard of aldicarb to children consuming these potatoes and about the manufacturer's merely temporary suspension of this use. With the Select Committee's permission, I would like to enter into the hearing record the American Academy of Pediatrics' letter to the EPA on aldicarb in potatoes. Fortunately, under direction from the Congress, the EPA has commissioned a study by the National Academy of Sciences to examine the safety of legal residues in food and also to examine whether children are exposed to excessive levels of this class of chemicals (cholinesterase inhibitors) throughout their environment. That report is due out next year.

There are many other examples where children are at the pivot of environmental decision making:

Ultraviolet light damage to the skin results in skin cancer. Recent studies show that the risks of skin cancer, particularly the most dangerous, malignant melanoma, is most closely related to the amount of sun damage the skin sustains during the first 18 years of life. The Select Committee is well aware that a number of man-made agents are the cause of ozone layer depletion and the potential for increased UV exposure on earth.

One example where the well-being of children was accorded appropriate weight was the tightening of the California standard for ambient ozone. This major component of smog has been linked to increases in bronchospasm, wheezing and asthma symptoms in children. As a result of research into the effects of ozone in children, the California Air Resources Board has recently promulgated a more stringent One Hour Air Standard for Ozone Air Pollution in California, which is 0.09 ppm. The current Federal standard is 0.12 ppm.

There are many other examples where children are the most sensitive portion of the population, as with lifetime cancer risks or with lead, or the most highly exposed, as with pesticides in foods. I am available to discuss these as the Committee chooses.

My third point is that while prevention still fights to be part of mainstream medicine, pediatricians must be, and are, the practitioners most aware that it is more effective to prevent disease rather than to treat. We are heartened to see leadership in the environmental area coming from the Public Health Service, particularly the Centers For Disease Control and the Agency For Toxic Substances And Disease Registry. My comments about Alar and aldicarb reflect that environmental regulators need more public health and pediatric input.

The Academy of Pediatrics has sought to make children's environments safer and healthier, often in direct ways such as efforts towards reducing tobacco, auto or bike trauma, occupational, or lead hazards. The Academy has also been in the forefront in offering common sense leadership on issues such as ozone air pollution or pesticides such as Alar.

In many situations clinicians can make major contributions, as investigators, as educators, and as advocates.

Those of us with the Academy of Pediatrics and the State of California are attempting to alert clinicians through joint training efforts with key federal agencies such as Centers for Disease Control and Agency for Toxic Substances and Disease Registry, such as the training underway today and tomorrow in Berkeley. This training is intended as a pilot project, that is to develop a curriculum usable elsewhere throughout the country. There is still a great need to get more and better training on environmental health into the basic medical curriculum, where it is likely to have its greatest effect.

We all know the story of the miners' canaries, their asphyxiation being the warning to the miners of a dangerous environment. If our canaries, our children, are safe then the environment will be fit for us all. It will involve research, that is our investigator role; it will involve caring for them and teaching them, our educator role; but most of all it will involve fighting for them, protecting them, our advocate role.

I appreciate the committee allowing me to share my thoughts.

May 8, 1986

Mr. Lee Thomas
Administrator
USEPA
401 M Street, SW
Washington, DC 20460

Dear Mr. Thomas:

The physicians of the American Academy of Pediatrics are concerned about the continued registration and use of the plant growth regulator daminozide (ALAR (R)) on apples in the United States. The Academy's Committee on Environmental Hazards have reviewed data on daminozide and have examined the strength of the cancer bioassays for daminozide and its degradation product, unsymmetrical dimethyl hydrazine (UDMH). Taken individually, none of these studies is definitive, however, the consistent finding of increased rates of cancer in test animals gives no reassurance about the safety of this chemical.

As pediatricians we are concerned about the well being of children and are frequently asked by parents which foods are the most healthful and wholesome for children. As a father of young children yourself, you no doubt have observed that apples, applesauce and juice are a significant component of the diets of infants and young children. Young children may experience a higher risk from a carcinogen than adults because exposure early in life would provide a longer period (or greater proportion of the lifespan) from first exposure for developing cancer.

In 1975 and in 1980 the Congress, through the FIFRA reauthorization process, mandated that adequate health effects studies, including carcinogenicity studies, be done on pesticide products. Daminozide and UDMH have qualitative evidence for carcinogenicity that is now more than 10 years old, and yet the manufacturer appears to have awaited the threat of suspension before instituting new, and one hopes, adequate carcinogenicity studies. During all this time, children consumed apple products containing daminozide and UDMH without the benefit of, at least, an adequate weighing of the risks of the exposure and without personal benefit to any child. The benefits of daminozide appear to accrue entirely to the grower, the risks to the consumer.

While a general recall of marketed products with detectable residues may not be warranted, parents should have the option of choosing infant and children's foods that do not contain daminozide and UDMH residues. We request that EPA make specific information available to the Academy and to the public so that we can make informed decisions. Specifically, information as to which apples and

processed foods are free of residues would be most useful.

In view of the consistently suggestive daminozide cancer data and the unwarranted delays by the manufacturer in instituting its cancer bicassays, despite the long-standing FIFRA requirement, the Academy respectfully requests that EPA suspend continued sale of daminozide. While the cancer risks of past use cannot be negated, continued food residues of a products with seven positive, though non-definite, animal cancer studies offers no benefits and certainly some risks to the health of American children.

Thank you for your attention to this matter.

Sincerely,

Martin H. Smith, M.D.

Martin H. Smith, MD
President
American Academy of Pediatrics

MHS:lb

ATTACHMENT F

SOURCE: "Aldicarb Food Poisonings in California - 1985-86: Toxicity Estimates for Humans." LR Goldman, M Beller, RJ Jackson, California Department of Health Services, in press, 1988.

Table 2. Dosage calculations for persons with ASO positive melons, California 1985, 1987, and 1988, and Nebraska 1978. (Amount eaten used to estimate grams consumed; weight estimated using average for age and sex.)

Case	Group	ASO (ppm)	Age	Sex	Amount Eaten	Wt. (kg)	Dosage (mg/kg)	Comment
Outbreak 1, Watermelon (1985):								
1	1	3.3	16	F	1 slice	56	0.027	*
2	1	3.3	11	M	1 slice	37	0.040	*
3	1	3.3	Adult	F	1 slice	57	0.026	
4	2	3.0	29	F	<1/4 melon	57	0.060	
5	2	3.0	32	F	1 slice	57	0.024	
6	2	3.0	58	F	1/2 slice	57	0.012	
7	2	3.0	40	F	1/8 melon	57	0.030	
8	3	2.7	62	F	1/4 melon	57	0.054	†
9	4	1.2	65	F	4 slices	57	0.038	
10	4	1.2	46	F	3 slices	57	0.029	
11	4	1.2	24	F	3 slices	57	0.029	
12	4	1.2	13	F	5 slices	46	0.059	
13	5	0.76	38	F	1/4 melon	57	0.015	
14	6	0.4	51	F	2/3 slice	57	0.0021	
15	6	0.4	50	M	1 slice	70	0.0026	
16	6	0.4	14	M	1 slice	54	0.0034	
17	6	0.4	22	F	1 slice	57	0.0032	
Outbreak 2, Watermelon (1987):								
1	1	0.3	37	M	2 slices	70	0.0020	
2	1	0.3	35	F	2 slices	57	0.0048	
3	1	0.3	12	F	1 slice	41	0.0017	
4	1	0.3	8	F	1 slice	26	0.0011	
Outbreak 3, Cucumber (1988):								
1	1	4.67	66	F	6 slices	57	0.0023	
2	2	1.8	56	F	1/6-1/3 cuc.	57	0.0074	
Outbreak 4, Nebraska, Cucumber (1978)								
1	1	6.6-10.7	23	M	1 cucumber	70	.022-.036	
2	1	6.6-10.7	6	M	1/2 cucumber	22	.035-.057	
3	2	6.6-10.7	40	F	?(1 cucumber)	57	.027-.044	
4	3	6.6-10.7	49	F	3/4 cucumber	57	.020-.033	
5	3	6.6-10.7	49	M	1/4 cucumber	70	.006-.009	

* Admitted to the hospital

† Bradycardia treated with atropine in an emergency room

ATTACHMENT G

April 20, 1990

Ms. Linda J. Fisher
Assistant Administrator
Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Dear Ms. Fisher:

On April 9, 1990 the EPA issued a joint statement with the Rhone-Poulenc Agricultural Company regarding residues of the insecticide aldicarb (Temik) in potatoes. The Committee on Environmental Hazards of the American Academy of Pediatrics is concerned that the information in the press release may mislead parents.

The press release recommends that consumers "continue their normal consumption of potatoes". It is the belief of our committee that when an individual food product is found to be contaminated with a pesticide residue at a level adequate to cause illness, it is appropriate to identify the source of that hazardous product so that the public can make informed decisions about its consumption. This is particularly true in the case of parental decisions about the safety of children's food. The press release should have included a statement about aldicarb levels found in potatoes, which the committe has subsequently learned to be as high as 9.4 ppm.

The committee is concerned that, if, for example, a 20 kg child were to eat a 200 gram baked potato with 9.4 ppm aldicarb sulfoxide (LD_{50} 0.9 mg/kg), that child would receive a dose of 94 micrograms per kg of body weight. This is a level many times the threshold level for aldicarb toxicity, which was determined in the 1985 aldicarb-in-watermelon episode in California. In that epidemic the threshold of toxicity was discovered to be about 10 micrograms per kg of body weight. This is the level that the National Academy of Sciences judged to be the NOEL for cholinesterase inhibition, of which the EPA Scientific Advisory Committee has been informed.

The committee is very concerned that the dose to the child consuming such a potato is only 10-fold less than the LD_{50}! In the California outbreak, exposures to similar levels were associated with the death of a fetus of one woman, with severe hypotension and bradycardia in another woman on digoxin therapy, and with other acute illnesses in many other persons.

The committee is also disturbed by EPA-Rhone Poulenc's description of symptoms likely to result from such an ingestion. The symptoms of significant aldicarb ingestion

include profuse diarrhea, muscle fasciculations, bradycardia, and other cholinesterase inhibitor symptoms. These are not symptoms of "flu" despite EPA's assertion. "Flu" correctly would be associated with fever, respiratory symptoms, and muscle aches.

The press release's omissions are significant. There is no identification of geographical areas where the contaminated potatoes were detected, no data on the efficacy or safety of boiling or blending of potatoes, and no interpretive insight into the press release's assertion that use of aldicarb on potatoes had not resulted in illness reports.

No illness has yet been reported due to potato consumption precisely because potatoes are eaten with other foods, because clinicians would not normally be aware of a carbamate-in-food risk, and because there is poor post-market surveillance of the effects of pesticides in food.

The press release should also have included a recommendation that persons who think that they may have been made ill, consult their physician who should notify appropriate public health authorities.

The committee also wishes to request further information on another potentially serious recent contamination by Aldicarb, in this case involving bananas. Bananas are, of course, a major food source for young children, being consumed by 21% of all children under age six and 31% of infants on a given day.

The committee wishes to commend EPA for requiring that Rhone-Poulenc carry out individual food sampling (because Aldicarb is an acute toxicant) and the committee urges EPA to provide more complete information to the public and to seek assistance from public health and child health professionals in the preparation of such reports.

Members of the Academy once again offer to EPA any assistance in your agency's dealings with environmental issues that may impact children's health.

Sincerely,

Richard J. Jackson, M.D., M.P.H.
Chairman

cc: J. Diliberti - AAP
H. Falk - CDC
P. Galbraith - CT
L. Goldman - AAP
R. Kotaras - AAP
P. Landrigan - Mt. Sinai Hospital NYC
R. Wiles - NAS
H. Moffonson - AAP
S. Richardson - DHS - FDB
W. Riley - EPA
J. Strain - AAP

Chairman MILLER. Thank you. Dr. Bearer?

STATEMENT OF CYNTHIA F. BEARER, M.D., PH.D., DIRECTOR, DIVISION OF PEDIATRIC ENVIRONMENTAL HEALTH, AT CHILDREN'S HOSPITAL IN OAKLAND RESEARCH INSTITUTE, OAKLAND, CA

Dr. BEARER. Yes. I would like to thank you for coming here today. The very fact that you are here shows your commitment to the health of children and their families. This is an important first step in educating the public about the environmental hazards and the special risk that they pose to children.

Let me identify myself. I am Cynthia Bearer. I am a practicing doctor, and a scientist. I am Board Certified in both pediatrics and perinatal, neonatal medicine. In addition, I have a Ph.D. in biochemistry. I am an active member of Easy Bay Neonatology, and I attend here in the Neonatal Intensive Care Unit at Children's Hospital, Oakland.

I am also the Director of the Division of Pediatric Environmental Health at Children's Hospital, Oakland Research Institute, and I am proud to say that this is the first such division in the country.

My current research, my current interests are on how environmental exposures affect the developing fetus. And in particular, my research is dealing with both alcohol and cigarette smoking on the development of the fetus.

The point I want to make here this morning, as has already been mentioned by several other people, is that children may be unwittingly serving as the canaries for our society, in terms of being the first to manifest adverse responses to environmental exposures.

Why is this true? Let me explain. For two reasons. Adults and children living in the same house may experience very different environments within that house. And that a given environment may be more hazardous to the child than to the adult.

Let me illustrate this with two points, using environmental tobacco smoke as an example. I think this is a timely and relevant example. As you know, (it came out in today's paper) a study is to be published in the New England Journal of Medicine on how children who are exposed to parental smoking are at two-fold greater risk that other individuals for developing lung cancer.

Well, other toxic effects of environmental tobacco smoke are well-known, and I will not spend the time to describe them here. What is less well-known is that, because of the two points I am going to talk about, parents who smoke may do more harm to their children than to themselves. Let me elaborate.

First, although children may be in the same macro-environment as adults, such as the house, they are actually in very different micro-environments within that house. For example, babies and infants spend a lot of time crawling or playing on the floor. It is known that heavier gases and particles, like those in environmental tobacco smoke, tend to layer out near the floor. Therefore, infants and babies are exposed to higher concentrations of these toxic chemicals.

Other examples of this are radon and the volatile organic chemicals that are coming off of synthetic carpeting, which also accumulate near the floor.

Secondly, a given environment may be more hazardous for the child than to the adult, for two reasons. First, the growing child has a higher metabolic rate, and therefore uses more oxygen per body weight than an adult, and therefore inhales more air per given body weight. Thus, their dose of the air pollutants will be greater.

It is also known that the smoke given off the burning end of the cigarette (that is the environmental tobacco smoke) has more toxic compounds in it than the smoke inhaled by the smoker. This is true for both the respiratory irritants in the smoke, and also the carcinogenic compounds that are in the smoke. Therefore, a child in the same room as a smoking adult is receiving a higher dose of these toxic chemicals.

Second, a cell is most susceptible to injury when it is growing by dividing or differentiating. And children's cells are always growing. For example, in a two-month-old child, the lung is still developing the air sacs, the alveoli in the lung. And this appears to be the reason why infants exposed to environmental tobacco smoke get sicker from common respiratory viruses and asthma, and will have smaller lung capacities.

This means that all environmental hazards are more hazardous to children because their cells are more sensitive. There is little we can do to prevent toxic effects once the exposure has occurred.

The cornerstone of pediatric environmental health is identification of hazards, and prevention of exposure.

There are several areas in which Congress can help. What is needed is more education, for both adults and for children, on what is harmful, and how these can be avoided. We also need more research to identify both what is harmful, and who is at risk.

And once a source of harmful exposure has been identified, we need the laws and means to remove it.

Thank you.

[Prepared statement of Cynthia F. Bearer follows:]

PREPARED STATEMENT OF CYNTHIA F. BEARER, M.D., PH.D., DIRECTOR, DIVISION OF PEDIATRIC ENVIRONMENTAL HEALTH, AT CHILDREN'S HOSPITAL IN OAKLAND RESEARCH INSTITUTE, OAKLAND, CA

WINDOWS OF EFFECTS—WINDOWS OF DANGER

The purpose of this document is to acquaint you with two facts: A child's **environment** is different than an adult's, and a child's biochemical and physiological **response** to the environment is different than an adult's. Therefore, the exposure and response of children to a given environmental pollutant cannot be extrapolated from the adult experience.

After having made this statement, I'd like to present you with the evidence on which it's based. I'd also like to show you that children are different amongst themselves depending on their stage of development. For each stage, they 're going to be exposed to very different environments and their bodies' ability to interact with these exposures will differ. I will be using environmental tobacco smoke (ETS) as a relevant and useful example along with some other clinical examples to illustrate these points. This manuscript is therefore organized to first present some background information on ETS, and then to discuss ETS in context with five of the major developmental stages in children: fetus, newborn, infant/toddler, school age and adolescence. Each developmental stage will be discussed in terms of exposure, dose (or absorption), metabolism, toxic action and toxic effect.

To use ETS as an example, one needs to know something about ETS. ETS is a complex mixture of chemicals including carbon monoxide, carcinogens such as polycyclic hydrocarbons and nitrosamines, particulate matter and nicotine. The relative contribution of each chemical to the mixture will differ with each cigarette smoked, so knowing the exposure to each component is currently impossible. ETS differs from mainstream smoke (the smoke inhaled by a smoker) in several different ways. Due to the lower core temperature for combustion in ETS, more incomplete products of combustion are found. Thus the concentration of the extremely carcinogenic compounds is 6 - 100 times greater in ETS than mainstream smoke. In addition, ETS was found to cause more tumors in mice than mainstream smoke.

Different components of ETS are metabolized differently. For example, two different enzymes trigger the process by which benzo(a)pyrene, a component of environmental tobacco smoke, turns into a carcinogen or is eliminated from the body. However, children have different amounts of these enzymes at different ages and, therefore, will make more or less of the carcinogenic compound depending on their age. This concept is important, as the degree of danger posed by almost every environmental hazard depends upon the developmental stage of the child and his or her ability to trigger these processes.

The rest of this discussion addresses the areas of exposure, absorption, metabolism, target tissues and toxic effects and the changes in these areas brought about during the normal process of human development.

During the fetal stage of life, the exposure of the fetus is that of the mother. Therefore, the fetus is exposed to "passive smoking" if it is the mother who smokes. So, apropos of the fetus, one would want to know if the mother smokes, or if she's exposed to ETS. Products of tobacco smoke can be found in umbilical cord blood for both actively and passively smoking mothers. Where

are women (and, for that matter, children) exposed to air pollution, including ETS? The daily dose of a pollutant depends not only on the concentration of the pollutant in a particular environment, but also on the length of time spent in that environment. This is true not only for mothers, but for children as well. Thus the child who spends the majority of time in the house with a smoking parent will have a higher exposure to ETS than a nonsmoking spouse who may go to work during part of the day.

Back to the fetus. The placenta acts as a barrier for many compounds but if compounds are of low molecular weight, such as carbon monoxide, they pass through it readily. Compounds which dissolve in oil such the carcinogens in ETS or alcohol (a component of wine and not tobacco!) pass through it easily. Other compounds may pass through using specific transport mechanisms. For example, lead is thought to take the place of iron for its transport across the placenta. The fetus can also be exposed to ionizing radiation (like x-rays), electromagnetic fields (like electric blankets), heat and noise.

How does the fetus get rid of/neutralize toxic chemicals? The fetus has very little capability of neutralizing harmful chemicals. It is dependent on its ability to send them back through the placenta to the mother, whose capability of ridding her body of harmful chemicals is far greater. The ability of both the fetus and the mother to do this can vary greatly.

What are the sensitive targets in fetal tissue? Rapidly growing cells are vulnerable to certain types of damage. The more cell divisions that are occurring, the more opportunity for toxins to cause cells to make inaccurate copies of DNA, which can lead to mutations and cancer. Rapid protein synthesis in the growing fetus can cause developmental errors and poor or abnormal growth. One good example of this concept is the formation of carbon monoxide-bound hemoglobin in the fetus from maternal passive smoking. This is thought to lead to a general lack of oxygen to the fetus with resultant poor growth.

It has been shown by epidemiologic studies that the toxic effects on the fetus of maternal smoking are: low birthweight, difficulty at birth, increased neonatal morbidity, increased rate of spontaneous abortion, and increased incidence of cleft lip and palate. The long term effects such as increased cancer in offspring are not yet known.

Many of these points are illustrated in my own research. I am investigating the biochemical pathways involved in the development of fetal alcohol syndrome, the leading known cause of mental retardation in this country. Alcohol use by adults often results in liver, brain, heart and pancreatic disease. However, in utero exposure to ethanol in some individuals results in a constellation of problems coined "fetal alcohol syndrome." These problems include poor growth before and after birth, midfacial maldevelopment such as small eyes, and poor mental development. Although the enzymes which convert alcohol to a toxic product occur in both adults and fetuses, the target tissues are different, there are different forms of the enzyme in adults and fetuses, and these enzymes are subject to individual variation. Therefore, there may be specific populations at high risk for the development of fetal alcohol syndrome in the context of maternal alcohol consumption.

The next stage of development is that of the newborn. The main sources of exposure to the neonate are the mother's environment , her breast milk, packaged formula, anything in contact with the babies' skin and pollutants brought into the home by the father. Breast milk has been shown to contain

several environmental pollutants including the products of smoking, polychlorinated biphenyls (PCBs), and lead. Because skin permeability is high during this period of time, thought should be given to what is in contact with the baby's skin. An epidemic of methemoglobinemia (a form of hemoglobin which does not transport oxygen) occurred following the exposure of infants to diapers that had been stamped with a dye to mark the name of the laundry service. The dye had been absorbed through the skin in quanitites sufficient to turn hemoglobin into methemoglobin and turn the babies blue! The father may also be an important source of exposure to the infant. Case reports have been made of lead poisoning from the dust carried home on Dad's clothing and shoes.

Newborn infants are also relatively incapable of metabolizing various chemicals. This is one reason why babies have yellow jaundice-they are not able to metabolize bilirubin as well as older children and adults.

Where do the toxins act in the newborn? The most spectacular rate of growth as a result of cellular division occurs before birth. Although cell division continues after birth, most of the growth is secondary to accumulation of proteins secreted by cells, and accumulation within differentiated cells of fat, muscle proteins and hormones. For example, within the nervous system, cell division is thought to be complete by the sixth month of pregnancy. However, the nervous system continues to undergo changes (otherwise babies would walk and talk!). The lung also continues to grow after birth. Growth of the body will continue to be rapid over the first year. Other tissues which will continue to have rapid cellular division throughout life include the blood system and skin. These tissues are all important targets for the action of toxins.

What effects have been found in newborns exposed to toxins? Babies exposed to ETS have been found to have smaller lung volumes, and may have general developmental delay. Growth has been shown to be slow. Motor development has recently been described as delayed in infants exposed to alcohol in breast milk. Cognitive function is impaired in infants who are exposed to both PCB in breast milk and lead from breast milk or dust. Effects on behavior have been found with a wide variety of environmental toxins.

Beyond the newborn stage are the infant and toddler stages which I will discuss together. What are the sources of exposure for an infant? At home, the infant is usually in the microenvironment near the floor since the infant is either lying or crawling on the floor. Thus the surfaces of the floor are important sources of toxins, as is the chemical content of the layer of air near the floor. Some of the surface contaminants which have been described are pesticide residuals, and formaldehyde from new synthetic carpeting. There are case reports which describe an association between rug shampoo and Reyes syndrome, a disease which affects both brain and liver function and often leads to death. Contaminants that tend to layer out and be in higher concentrations near the floor are mercury vapor from latex paint, and radon which is in highest concentrations in the lowest part of the house. The heavier particles in ETS may also tend to settle out near the floor. Infants are also at risk for exposure from their normal tendency to put things in their mouths. Lead poisoning is frequently described by this mechanism. Another surface with which the infant is in contact is the yard around the house which may be contaminanted with lead, pesticides or herbicides. An infant's diet is also different than an adult's and thus safe levels of food additives which have been calculated on a lifetime

exposure for an adult may be grossly in error for an infant. Such is the case with ALAR, a chemical sprayed on apples for years.

Given these exposures, how does the infant absorb the toxins. First, the lung remains a large absorptive surface area. An infant also has a high rate of respiration, and respires more air per kilogram than an adult due to his higher metabolic rate and need for oxygen. Thus, given the same concentration of pollutants from ETS, an infant will absorb more per bodyweight than an adult. An infant is exposed to many objects by his normal exploratory behavior which may convey important toxins. Diet is also an important factor regulating dose. Infants have different quantitative as well as qualitative differences in their diet. Their total consumption of calories is larger per kilogram body weight than an adult, so that any food additive will constitute a higher dose for an infant. Lastly, there is a qualitative difference in their diet. It is higher in fruit, vegetables and milk products than the average adult diet.

The metabolism and excretion of various compounds is also rapidly changing during this stage of development with development of several of the adult pathways of detoxification.

Many toxic effects of ETS have been observed on the infant. Toxic effects can be divided into acute effects and chronic effects. Acute effects are easy to associate with the environmental exposure because of the direct temporal association between exposure and effect. Chronic effects are much harder due to the often long latency period between the exposure and the disease. Acute effects in infants exposed to ETS include: bronchitis, pneumonia, tracheitis, laryngitis, increased morbidity with RSV infection and chronic middle ear effusions. The chronic effects are unclear, although there are reports of increased incidence of cancer with lifelong exposure to tobacco smoke beginning in childhood.

The school age children is exposed to a different environment than the infant or toddler. Now the child is venturing beyond the immediate confines of his home and parent's environment and is exploring his neighborhood, is going to school, the playground and, perhaps, day care. What are the important exposures in his neighborhood? That is different for every child, but it may be a heavily industrialized area, near a major roadway or a nuclear arms plant. Parents have been increasingly concerned about schools because of the publicity about school asbestos and other problems. Often schools have been sited in neighborhoods with open space, like the right of way for a powerline, or the site of an old industry with unknown emissions and wastes. School is a common source of asbestos exposure. All school districts have been told to look for and to deal with loose (friable) asbestos in school construction. Play areas may contain environmental toxins. Playground equipment may have wood treated with wood preservative (arsenic, pentachlorophenol, chromium) that is toxic if ingested. Some sand is contaminated with asbestos. School age children may use toxic art and crafts products. The label of "nontoxic" doesn't mean that it is nontoxic if eaten or used improperly. A significant period of time is spent in day care by some youngsters and may be a source for ETS exposure.

The effects of some toxins on school age children have been well described. Acute effects are the same as those described for infants and toddlers. However, chronic effects can be measured in the school aged child. A chronic low dose effect of lead on cognitive development is of intense public concern currently. Chronic effects of ETS include: asthma, increased

immunoglobin E levels, decreased lung function, chronic cough, increased phlegm production, snoring and increased incidence of lung cancer later in life.

The last stage of development to be discussed is the adolescent. Exposure for the adolescent includes two new areas. One is the adolescent's ability to expose him or herself to environmental toxins, i.e. they may decide to start smoking themselves. The other new area of possible exposure is that of occupational hazards. A large number of adolescents have part time jobs during school and may have summer jobs. Often these jobs expose these individuals to dangerous equipment, such as farm equipment or cars (delivering pizza). Child labor laws have recently been in the news as often being violated by the companies that hire these teenagers.

The absorption for an adolescent is much the same as that of an adult for a given exposure. However, the metabolic pathways continue to undergo change. As compared to the school aged child, the rate of metabolism of drugs and toxins decreases. The change in rate may be involved with the changes involved in steroid metabolism during puberty, as steroid metabolism is also dependent on the same enzyme systems.

Due to the changes brought on by puberty, the target tissues may differ for adolescents. Again, growing, dividing, differentiating tissues are those that are most sensitive to environmental influences. During puberty, rapid growth is occurring in the viscera, skeleton and muscles of the body. There is also development and differentiation of the reproductive system. This may be one reason why young chimney sweeps were prone to development of scrotal cancer from their exposure to soot. However, much of this remains conjecture.

Acute toxic effects of ETS include cough, asthmatic attacks, and eye irritation. Chronic effects include abnormal lung function, increased risk of lung cancer during their lifetime, and addiction.

So, in summary, each developmental stage is unique for 1. sources of exposure, 2. routes of absorption, 3. metabolic pathways, 4. tissue and organ sensitivity and 5. toxic effects. What can Congress do to promote pediatric environmental health? More research is needed to identify potential environmental hazards. What is toxic? Are there individuals who are particularly susceptible to certain types of toxins? Are there rational means of preventing exposure, or preventing toxic effects? For those known environmental hazards, education and prevention is the key. While we still need research, education is quite significant in preventing environmental health effects. We need more educational programs, both for parents and for children themselves. Prevention of environmental exposure also occurs through cleaning up the environment. Sources of environmental contaminants need to be identified and ablated. Thus, research, education and environmental source ablation are three areas which need attention to keep our children health and strong.

Chairman MILLER. Thank you very much. Dr. Goldman.

STATEMENT OF LYNN GOLDMAN, M.D., M.P.H., CHIEF OF THE ENVIRONMENTAL EPIDEMIOLOGY AND TOXICOLOGY BRANCH OF THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES, EMERYVILLE, CA

Dr. GOLDMAN. Good morning, and thank you for inviting me to speak before your committee.

I am Lynn Goldman, and I am the Environmental Epidemiologist for the State of California, and Chief of the Environmental Epidemiology and Toxicology Branch.

I am responsible for California's Childhood Lead Poisoning Program, and also for the epidemiological investigations that have been carried out by California in response to childhood cancer outbreaks in the Central Valley of the State.

In addition, I am a Board Certified pediatrician with training in public health and epidemiology.

The California Department of Health Services serves all of the public health needs of the state, of which environmental health needs of children have been an important priority. And in these remarks, I am going to address four issues that are concerns for our Department.

One is the childhood cancer outbreaks in several small towns in the state, about which you have already heard some information this morning. Second is the childhood lead poisoning problem, and especially in inner city areas in the state. Third is the lack of adequate health care access for children affected by these problems, and fourth is the lack of adequate training in environmental health for physicians who care for these children.

These problems do not have easy solutions, and really need attention on the part of the Federal Government to address them.

I am certain that the committee, in preparing for these hearings, has already learned much about the childhood cancer problems in McFarland and Earlimart, California. The committee may not be aware of several similar childhood cancer excesses identified in other small towns in California. And I am going to use McFarland for the case study, for the purpose of my remarks.

Back in 1984, the State Health Department was notified about the occurrence of several cases of childhood cancer in the town of McFarland. During the time since then, many more cases have come to our attention. And in fact, now we have a tally of 13 confirmed cases of childhood cancer occurring in that town between 1978 and the present. We really do not have evidence that this excess rate of cancer has abated since that time.

Since our investigations began in 1984, much progress has been made. We have interviewed all the cases, and we looked for factors in common for cases, compared to other families in the town, focusing on issues such as diet and pesticides. We have also done extensive environmental investigation of the town.

So far, these investigations have been somewhat disappointing, in that we have been unable to determine the causes of the cancers in McFarland. In addition, we have been studying all the childhood cancer cases that have occurred throughout a four-county region,

containing McFarland, over a nine-year period. We counted some 400 cases of childhood cancer.

From that investigation, we concluded that the overall rate of cancer in the surrounding counties was not unusual, and that there was no evidence that the farming areas as a whole had increased rates of childhood cancer. But we are doing some more detailed examinations of the data to look at smaller areas, such as the areas around McFarland and Earlimart.

And in addition, our study has been rather limited, in that we have not been able to interview the families of those 400 cases to find out about the individual exposures that they or their parents may have had.

What have we learned from McFarland, and the similar investigations? One thing that is problematic is that very little is known about what causes the types of childhood cancers that occurred in McFarland. Therefore, it was necessary for us to conduct a very comprehensive and wide-searching investigation.

It is very difficult to conduct epidemiological investigations of small numbers of cases where the exposures are poorly defined. And there are not very many clues from the scientific literature about where to look.

Questions raised by McFarland need to be addressed by larger studies of childhood cancer.

The second thing is that childhood cancer studies are not a very powerful way to examine the risks of pesticide exposures. More precise tools are needed to measure exposure, and to detect more subtle evidence of damage that leads to cancer.

This kind of research requires support from the Federal Government.

We have also learned that there is a gap between the community perceptions of what science can do, and the reality of scientific limitations. For example, a problem that happened in Minimata, Japan—children being born with mental retardation and developmental disabilities—was traced to methyl mercury contaminating the harbor, and the fish that the families were eating. It really took around 15 years before the methyl mercury was pinned down as definitely being the cause of this problem. So that this kind of problem takes time to investigate, and needs better tools, so that we can investigate these problems in a more timely fashion.

One step that has been taken in California is to establish comprehensive state-wide cancer reporting and birth defects reporting and monitoring, to facilitate identifying and investigating problems like McFarland. And those programs count every single case of cancer, and every single birth defect, that occurs in the reporting areas, not just deaths, as was stated by another speaker. But these programs have been fairly recently established. And so we do not have complete sets of data for the areas that we are concerned about. And as was pointed out earlier, there may be problems still with the completeness of the reporting. And so we are not in a position yet to be able to say exactly what the numbers of cases are that occurred in all the areas of the State.

Here again, the Federal Government can be of assistance, particularly for setting priorities for use of our limited epidemiologic resources. One thing that we need is more training of scientists in

the field of environmental epidemiology. We are at a loss finding qualified individuals to assist us in carrying out many of these investigations. And our training programs have not been turning out the kind of people we need to be able to study these very subtle and complex problems.

It is also important for the National Cancer Institute to continue to fund studies that will increase our understanding of the causes of cancer, particularly childhood cancers. These studies would enhance our ability to assess clusters when they occur.

I would now like to turn my attention to a pediatric problem that is well understood, preventable, and has yet to be adequately addressed on a national level. This is the problem of childhood lead poisoning.

Generally, good public health policy sets exposure limits for toxins well below the lowest observed adverse effect level, or the lowest dose of which health effects are known to occur. Based on recent studies, the Agency for Toxic Substances and Disease Registry estimated that lead is neurotoxic; that is, toxic to the central nervous system, or the brain, to children at levels as low as 10 to 15 micrograms per deciliter, well below levels once thought safe. It is estimated that 400,000 children in the U.S. are born with blood lead at these levels each year. And that between three and four million American children now have blood lead levels at or above this range.

What is not usually appreciated is the nationwide scope of the problem. Lead is present at potentially toxic levels in the West, as well as in the East.

For several years, California had no program to address the problem of lead poisoning. In 1986, we did establish a program to conduct studies to estimate the magnitude of the problem state-wide. In neighborhoods in East Oakland and in Los Angeles County, we found that around 20 percent of children between the ages of one and six had blood lead levels above 15. Both areas had homes with extremely high levels of lead in paint. And the neighborhood we studied in Oakland had very high levels of lead in soil.

Lead is the only toxic substance to which we knowingly allow our children to be exposed above the lowest observed adverse effect level. There is no evidence for a level that is safe for lead, and no margin of safety for current levels.

What is the cost to society because of I.Q. loss to hundreds of thousands of children? Childhood lead poisoning can be completely eradicated. But to do so will require much more attention to primary prevention; that is, to removing lead from the environment of children.

The phase-out of lead from gasoline and house paint was a start. But many other unnecessary uses of lead exist. And there needs to be a comprehensive program to address the problem of lead paint on houses.

I know that there are several new pieces of legislation that have been introduced in this area. I think that it is very important to support that.

In California, we have begun to develop regulations for lead in household paint and soil. Currently, there is not even a standard

that local health departments can use to enforce lead problems in households and around homes.

The Federal Government could be of assistance in several ways. One is that the support for basic research in several areas, including a less painful and more efficient technique for screening children for lead exposure. Currently the best method is to draw blood by venipuncture, and physicians do not like to inflict pain on children by doing screening tests. It has been a very difficult thing to sell. Second, we need a more cost-effective technique for removing paint from housing, without further damaging children, workers, and the surrounding environment. And we also need nationwide reporting of lead poisoning to the U.S. Centers for Disease Control.

Another area of concern is that children at risk for environmental exposure have inadequate access to health care. And this is something that we have encountered in the State Health Department, with our epidemiological studies of both childhood cancer and lead poisoning.

Anecdotally, before we went into McFarland, we heard from parents and health professionals that children with cancer in McFarland would have had a better prognosis if their cancers had been diagnosed and treated earlier. In our studies of McFarland children, we found that average household incomes were below $15,000 per year. And 46 percent of the families had no health insurance, not even Medicaid. And 20 percent had Medicaid coverage. And the physicians who do practice there do not accept Medicaid. So poor families must travel long distances for care, or pay out-of-pocket. In fact, we found that many people in McFarland who have Medicaid do pay out-of-pocket for care.

Although urban areas have more physicians per capita, we found similar problems in the childhood lead studies. For example, 41 percent of the families in the neighborhoods we studied in Los Angeles were without any kind of health care insurance.

Inadequate access to health care for children has increased over time. And no easy solutions have emerged. Federal leadership needs to find innovative ways to assure that all families have access to care.

The last area that we are addressing is inadequate training of physicians. In both our lead reporting system and our conversations with physicians who are treating cases of childhood lead, and also in investigating cancer clusters, we found that physicians have inadequate knowledge of problems such as lead, pesticide poisoning, and air pollution. And they don't know how to identify and report possible environmental health problems. In partnership with Children's Hospital and the Agency for Toxic Substances and Disease Registry (ATSCR), we have been working to develop a curriculum to train physicians in pediatric environmental health. The course will be given for the first time this week, and we are hoping that it will become a model for training all physicians who will take care of children.

Thank you again for the opportunity to testify. Our State has already taken several steps to address the effects of environmental exposure on children. But much more needs to be done. All research in this area is hindered by inadequate levels of funding, and by lack of appropriate priority-setting.

Our children are an investment in the future. We must take the necessary steps to ensure their health and well-being, and thus to ensure our competitiveness as a nation. We urge you to take a close look at the problem, and to develop Federal policies that will enhance our ability to prevent harmful environmental exposures to children.

[Prepared statement of Lynn R. Goldman follows:]

PREPARED STATEMENT OF LYNN R. GOLDMAN, M.D., M.P.H., CHIEF OF THE ENVIRONMENTAL EPIDEMIOLOGY AND TOXICOLOGY BRANCH OF THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES, EMERYVILLE, CA

Good morning Mr. Chairman. I am Lynn R. Goldman, M.D., state of California Environmental Epidemiologist and Chief of the California Department of Health Services' Environmental Epidemiology and Toxicology Branch. I am responsible for California's Childhood Lead Poisoning Program and for the epidemiological investigations that have been carried out by California in response to childhood cancer outbreaks in the Central Valley of this state. In addition, I am a board certified Pediatrician with training in public health and epidemiology and have published extensively in the area of environmental health.

The California Department of Health Services serves all of the public health needs of the state of which environmental health needs of children have been an important priority. In these remarks, I will address four issues which are of concern for our Department: (1) childhood cancer outbreaks in several small towns in the state; (2) childhood lead poisoning problems in inner city areas in the state; (3) lack of adequate health care access for children affected by these problems; and (4) lack of adequate training in environmental health for physicians caring for these same children. These problems do not have easy solutions and are not amenable to state-by-state approaches. Rather they point to the need on the Federal level for increased attention to environmental hazards for children.

I am certain that the Committee, in preparing for these hearings, has already learned much about the childhood cancer problem in McFarland, California. The committee may not be aware of similar childhood cancer excesses identified in several other small towns in California (Rosamond, Montecito, and Earlimart). Since the McFarland problem is better known, I will briefly describe it to you but only for use as a case study. The other cases are of equal importance but have been of less interest to the general public.

Back in 1984, the California Department of Health Servces was notified about the occurrence of childhood cancers in the small town of McFarland. At that point six cases had been identified but by the end of 1985 three additional cases were found (for a total of ten cases) and an investigation was begun. We continued to monitor the occurrence of cases of cancer in the area. Three more cases occurred

between 1986 and the present, for a total of 13 confirmed cases. (A "confirmed" cases is defined as a malignant tumor occurring in a child under the age of nine and living in the town at the time of diagnosis.) Since 1984, the cancer rate has been about three times the expected rate.

Since the investigation began in 1984, much progress has been made. All cases were interviewed to look for factors more common in cases compared to controls. The interviews focused on diet, pesticides, and other environmental exposures. The only common factor was residence in McFarland. An extensive environmental investigation was carried out to look for evidence of cancer causing agents like pesticides applied in the area. The investigations examined drinking water, soils, and even electromagnetic and microwave exposures from home wiring and nearby transmitters. Through these environmental investigations, we have been able to alleviate some of the community concerns about the quality of the environment. In addition, we have begun a study of childhood cancer incidence rates in a larger four county region around McFarland.

So far, these investigations have produced the following findings. First, we have been unable to date to determine the cause of the cancers in McFarland. It is likely that the occurrence was through a combination of exposures at lower dose that cannot be determined epidemiologically (but which may have occurred in this community by chance), through past exposures no longer present in the community, or that we do not have the tools to identify the carcinogen in the community. The region wide investigation has concluded that the overall rate of cancer in surrounding counties is not unusual and that there is no evidence that farming areas as a whole have increased rates of childhood cancer. More detailed examination of the data is proceeding to look at rates in smaller areas, so additional findings are anticipated for that part of the investigation.

We have not been able to interview cases about individual exposures so our findings must be interpreted with caution.

What have we learned from McFarland?

Very little is known about the causes of the types of cancers found in McFarland, or in the other communities I mentioned earlier. Therefore, it was necessary to conduct a very comprehensive and wide-searching investigation. It is very difficult to conduct epidemiological investigations of small numbers of cases with poorly defined exposures. Questions raised by McFarland need to be addressed by larger studies of childhood cancer.

Cancer studies are not a very powerful way to examine risks of pesticide exposure. More precise tools are needed to measure exposures and to detect more subtle evidence of damage that leads to cancer. These tools need to be applicable to population based epidemiological studies. This means that development of tools must be taken beyond the laboratory bench and into the real world. This kind of research requires support from the Federal government, utilizing university resources.

We have also learned that there is a large gap between community perceptions of what science can do and the reality of scientific limitations. For example, back in the 1950's the Japanese began to notice an increase in mental retardation and cerebral palsy among children in a small town called Minimata. It took 15 years for scientists to prove that the methyl mercury that contaminated the harbor and its fish caused the congenital defects in these children.

One step that California has taken is to establish comprehensive statewide cancer reporting and monitoring to facilitate identifying and investigating problems like McFarland. In addition, to avoid the initial delays that occurred with McFarland, we have written a protocol for conducting the initial phases of an investigation, and have trained California's local health departments. However, scientific investigation will still require time and intensive labor. And despite that many investigations will reach blind alleys.

Again, the federal government can be of assistance, particularly for setting priorities for use of our limited epidemiologic resources. Training more scientists in the field of environmental epidemiology (especially exposure assessment) and development of better investigatory tools would also help the

process of conducting these investigations. It is important for the National Cancer Institute to continue to fund studies that will increase our understanding of the causes of cancer, particularly childhood cancer. These studies would enhance our ability to assess clusters.

I would now like to turn my attention to a pediatric problem that is well understood, preventable, and has yet to be adequately addressed on a national level. The Committee is probably also well aware of the problem of childhood lead poisoning. Generally good public health policy sets exposure limits for toxic substances well below the Lowest Observed Adverse Effect Level (or lowest dose at which health effects occur). Based on recent studies, the Agency for Toxic Substances and Disease Registry (ATSDR) estimated that lead is neurotoxic to children at levels as low as 10-15 ug/dl (micrograms per deciliter) -- well below levels once thought safe. It is estimated that 400,000 children in the U. S. are born with blood lead at these levels each year and that between three and four million American children now have blood lead levels at or above this range. What is not usually appreciated is the nationwide scope of the problem; lead is present at potentially toxic levels in the West as well as in the East.

For several years California had no program to address the problem of lead poisoning. In 1986, we established an innovative program to conduct studies to estimate the magnitude of the problem statewide. In neighborhoods in East Oakland and in Los Angeles County (Wilmington and Compton), we found that around 19% of children between ages of one and six had blood lead levels above 15. Both areas had homes with extremely high levels of lead in paint and Oakland had very high levels of lead in soil. Lead is the only toxic substance to which we knowingly allow our children to be exposed above the Lowest Observed Adverse Effect Level. There is no evidence for a level that is safe for lead and no margin of safety for current levels. What is the cost to society because of IQ loss to hundreds of thousands of children?

Childhood lead poisoning can be completely eradicated. But to do so will require much more attention to primary prevention, that is, to removing lead from the environment of children. The phase-out of lead from gasoline and house paint was

a start, but many other unnecessary uses of lead exist. A comprehensive program to address the problem of lead paint on houses is needed. California has already moved forward with a program to study methods for removing lead from home environments. In addition, we have begun to develop regulations for dealing with lead in household paint and soil. California developed one of the first lead poisoning reporting programs whereby cases of childhood and occupational lead poisoning must be reported to the Department of Health Services.

The federal government could be of assistance in several ways. One is that the support for basic research in several areas, including a less painful and more efficient technique for screening children for lead exposure. Second, we need a more cost effective techniques for removing paint from housing without further damaging children, workers, and the surrounding environment. Nationwide reporting of lead poisoning cases to the Center for Disease Control would help states put our problems into better perspective. And there needs to be a long range plan to rehabilitate old, lead contaminated housing stock.

Another area of concern is that children at risk have inadequate access to health care. Both rural neighborhoods like McFarland and the urban neighborhoods where we studied lead exposures exemplify this problem. Our studies have shown that in areas where the environment is of most concern, parents are least able to obtain routine medical care for their children. Both parents and health professionals thought there would have been fewer deaths if the McFarland cancer had been diagnosed earlier. Average household incomes in McFarland are below $15,000 per year. In McFarland, 46% of the families had no health insurance, and only 20% had Medicaid coverage. And the physicians who practice there do not accept MediCal (the state medicaid program). So poor families must travel long distances for care or pay out of pocket. Even parents in McFarland with private medical insurance reported that they must pay out of pocket beyond what they afford for their children's health care. Although urban areas have more physicians per capita, similar problems were found in the childhood lead studies. For example, 41% of families in our Los Angeles Lead Survey were without health insurance coverage. Inadequate access to health care for children has increased

over time and no easy solutions have emerged. Federal leadership needs to find innovative ways to assure that all families have access to care.

The last area that we are addressing is inadequate training of physicians. Our lead reporting system has shown that even in areas with high lead levels, physicians are not screening children for lead poisoning. Our experience with problems in communities like McFarland has shown us that physicians have inadequate knowledge of problems such as pesticide poisoning, air pollution, and how to identify and report possible environmental health problems. In partnership with the private sector (Children's Hospital Oakland), the American Academy of Pediatrics and the ATSDR, California has been developing a curriculum to train physicians in pediatric environmental health. The course will be given for the first time on September 7 and 8, 1990. We hope that it will become a model for training all physicians who take care of children.

Thank you again for the opportunity to testify. Our state already has taken several steps to address the effects of environmental exposure on children. But much more needs to be done. All research in this area is hindered by inadequate levels of funding and by lack of appropriate priority setting. Our children are an investment in the future. We must take the necessary steps to ensure their health and well being, and thus to ensure our competitiveness as a nation. We urge you to take a close look at the problem and to develop federal policies that will enhance our ability to prevent harmful environmental exposures to children.

Chairman MILLER. Thank you. Dr. Jukes.

STATEMENT OF THOMAS H. JUKES, PH.D., DEPARTMENT OF BIOPHYSICS, UNIVERSITY OF CALIFORNIA, BERKELEY, CA

Mr. JUKES. My name is Thomas Jukes. I am Professor of Biophysics at the University of California.

Chairman MILLER. We will have to get you to speak up a little bit. It is a little hard for people in the back to hear.

Mr. JUKES. Should I get closer to the microphone?

Chairman MILLER. Yes. There you go.

Mr. JUKES. I have been a professor of Biophysics at the University of California in Berkeley since 1963. I have a Ph.D. degree in Biochemistry. And I have also worked in nutrition, vitamins, and cancer chemotherapy.

My wife and I have seven young grandchildren. My main involvement in cancer in children is that I received the Bruce F. Cain Memorial Award in 1987 in the American Association for Cancer Research, for my participation in work on methotrexate. This was the first compound that was successfully used for treating leukemia in children. Before that, childhood leukemia had no treatment. And my work on this was when I was at Lederle Laboratories from 1947 to 1952.

I support the proposal of the committee to investigate environmental toxins in children's health. This needs careful scientific analysis, because there have been recent panics. There has been more discussion about pesticides than any other topic this morning, and I was very glad to hear some attention given to lead, and to second-hand cigarette smoke, by the last two speakers.

It is quite easy to arouse fear by telling parents that their children may be poisoned by their food. In 1989, it was announced by FDA that Chilean grapes were contaminated with cyanide. As a result, tons of perfectly good fruit were dumped into the garbage, and the Chilean fruit industry was severely damaged.

The contaminated grapes that started the panic were found by the FDA to contain three micrograms of cyanide in each of two grapes. Now, the amount of cyanide normally present in lima beans is 100 micrograms per gram. So this panic was completely unnecessary. And I notice in the papers again this morning that the Chileans were threatening to sue the FDA for this matter.

I dwell upon these figures because this illustrates the basic principle of toxicity, that the dose alone makes the poison. And as analytical methods are refined, we can detect more substances in foods and produce at very, very low levels.

The use of pesticides in food production must benefit the consumer. And as has been brought out this morning by Congressman Stark, the person who applies the pesticides must be protected.

The value of pesticides is that pests are destroyed. And that pests consume and contaminate crops. Moths grow on food, and produce cancer-causing toxins. Moths are killed by fungicides, which are pesticides. One pesticide has saved more lives, and prevented more disease, especially in children in the third world, than any other chemical in history. That pesticide was DDT.

The yields of fruit and vegetables are increased by the use of pesticides that are applied by controlled methods that have been approved. Fruits and vegetables are recommended by all leading health authorities as variable for the prevention of cancer. Any program that deprives children of fruits and vegetables is removing nutritionally important foods that prevent cancer.

What are the risks? It is encouraging that during the years 1940 to 1983, in which synthetic pesticides came into use, life expectancy has risen from 63.6 years to 74.6 years.

Pesticide residues are not present in detectable amounts in most foods. The California Department of Food and Agriculture tested over 14,000 food samples in 1988, and again in 1989. No residues could be detected in more than 70 percent of the samples, both years. Residues were less than 50 percent of legal limits in another 20 percent of the samples. The legal limits provide about 100-fold margin of safety. Only one-quarter of one percent had residues above the limits. And these figures are on the table at the back of my testimony.

These figures tell us that to protect our children, we should be focusing primarily on something different from pesticide residues. There are many important problems. Lead poisoning is one. And I should mention here that when, before the introduction of organic pesticides, lead arsenate was used on foods. And you could see the lead arsenate on pears in the supermarket in the 1940s. So that is one thing that pesticides have done.

I would list also passive exposure to cigarette smoke, fetal alcohol syndrome. The fetal alcohol syndrome, I have written warnings against that. And my wife is a schoolteacher, and she sees the results of the fetal alcohol syndrome in children in her class.

Also malnutrition is a very important problem for children.

It is generally concluded that the incidence of cancer could be substantially reduced by improving the diet. This conclusion comes from comparing diets in different countries with incidence of various types of cancer. High-fat diets may definitely be a cause. More fiber in the diet, and more fruits and vegetables, are strongly advised. These conclusions are based on incidence of cancer in human beings.

The levels of carcinogens naturally present in the diet are thousands of times greater than residues of synthetic pesticides. Scorched or burned foods contain highly potent carcinogens, as shown by animal tests, reported by Sugimura in Japan. Plants produce toxic substances, some of which are carcinogens, to protect themselves against insects. Professor Ames estimates that 50 percent of all chemicals, either natural or synthetic, that have been tested, are carcinogenic at high levels of a toxic.

There are lots of carcinogens always in food. And we protect ourselves against their effects by means of natural anti-cancer substances, such as antioxidants. And of course, these can be added to an improved diet.

Of course, very large doses of carcinogens, such as cigarette smoke, alcohol, or sunburn can overcome the natural means of protection.

The Mayo Clinic Nutrition Letter, in June, 1989, said:

America's food supply is abundant, and generally quite safe, more so than in the past. We believe hysteria over pesticide residues is unwarranted. The pesticide residue limits are often set several hundred times lower than the level that caused no effects in test animals.

The results of the FDA market basket study show that after cleaning, peeling, and cooking, foods generally contain less than one-hundredth the amount of pesticide residues established by international organizations. Increasing your consumption of fruits and vegetables may lower your risk of developing some types of cancer. In general, you can feel confident in the safety of what you eat.

Now, Alar and UDMH have been mentioned several times today. On February 26, 1989, the TV program "60 Minutes" showed a red apple with a skull and crossbones. And the announcer stated that the "most potent cancer-causing agent in our food supply is a substance sprayed on apples."

This TV program, which caused public panic nationwide, was based on data supplied by the Natural Resources Defense Council. I disagree with their conclusions.

Tests with Alar showed that it did not cause increased cancer in either mice or rats when fed at doses as high as one percent of the diet. The red apple on TV would have contained about 0.2 milligrams of Alar, or one-third of a microgram of UDMH.

When food containing Alar is processed, Alar breaks down to UDMH and succinic acid. The rate of breakdown was five percent to nine percent in processed applesauce, with a top level of 44 parts per billion of UDMH.

UDMH tested negatively for cancer in rats. And in mice, was negative at 10 and 20 parts per million in drinking water.

Tumors were observed in 20 percent of animals that received 80 parts per million, but 80 percent of the mice died prematurely, indicating that the minimum toxic dose had been exceeded. But tumors were probably caused by toxicity to the liver. And these findings show the existence of a threshold for the toxic action of UDMH.

The Natural Resources Defense Council said in their publication that "UDMH is the greatest source of the cancer risk from pesticides identified by NRDC." The levels of intake of UDMH, from the EPA, FDA, and USDA data, are 1.6 micrograms daily for a 20-kilo child.

Now, let's compare that with some of the other things that we eat. Our normal intake of arsenic is about 1,000 micrograms daily. And of cadmium, 200 to 500 micrograms daily. Both arsenic and cadmium are regarded as human carcinogens.

We produce about 200 micrograms of steroid hormones daily, which are regarded as carcinogens. Extrapolation of carcinogenicity to such low levels as 1.6 micrograms is scientific nonsense, even if the biological tests were valid, which obviously was not the case.

California State Health Director, Dr. Kenneth Kizer, noted that giving up fruits and vegetables will surely result in more cases of cancer than would ever result from trace pesticide residues. Alar reduces the dropping of apples that rot on the ground and harbor pests, including molds. Molds on apples produce patulin, a suspected carcinogen. So that is the latest I have on that.

The NRDC declared on November 14, 1989, that "use of a chemical whenever the benefits outweigh the risks is absolutely anathema to the scientific community."

Actually, we spend much of our lives taking actions in which the benefits outweigh the risks. Dr. Sanford Miller, a former director of the FDA Bureau of Foods, reportedly was quoted as saying in 1990, "The risk of pesticide residues to consumers is effectively zero. This is what some 14 scientific societies representing over 100,000 microbiologists, toxicologists and food scientists, said at the time of the ridiculous Alar scare."

Now, Dr. Richard H. Adamson, who is Director of the Division of Cancer Etiology of the National Cancer Institute, made the following statement on August 22, 1990: "At the present time, I am unaware of evidence that suggests that regulated and approved pesticide residues in food contribute to the total human cancer in the United States. Epidemiologic studies do suggest that certain herbicides and pesticides increase the risk for certain types of neoplasms in those persons who are heavily exposed to them, especially pesticide applicators," as we have heard today.

Now, when DDT was banned, of course, the risk to farmworkers was greatly increased, because they switched to perithion, and that caused the deaths of several farmworkers, when DDT had never caused the death of a single worker.

Age-adjusted mortality rates among white children, ages zero to 14 years, have decreased by 35 percent between 1973 and 1986. The rate of cancer deaths at all sites in 1973 was 5.6 per 100,000 in this age group. And in 1986, was 3.6 per 100,000.

The incidence rate for acute lymphocytic leukemia, which I am interested, increased between 1973 and 1980. But the mortality rate decreased from 1.4 in 1973 to 0.7 in 1986, possibly because of chemotherapy. Data are from the National Center for Health Statistics.

My conclusions regarding pesticide residues in foods are as follows:

Analysis of foods show that in most cases, pesticide residues were not detected, and in nearly all other cases, the residues were within tolerance limits. These findings show that the problem is a minor one, regardless of other circumstances.

A National Cancer Institute spokesperson stated he was unaware of evidence that suggested that pesticide residues in food contribute to the toll of human cancer in the United States, as I have just stated.

Third, various public health authorities agree that protection against cancer by fruits and vegetables outweighs any effects of pesticide residues.

Fourth, plant protectant chemicals—pesticides—make a second contribution to the prevention of cancer by destroying molds that produce carcinogens in foods, and that are found in organic foods.

The apple scare was based on mouse tests for UDMH that were unreliable, incomplete, and flawed by toxicity.

Finally, the public is highly sensitive to scare stories about food, and scientists should at all times try to supply authoritative information on this topic.

I am fully aware of the political implications that Congressman Stark mentioned this morning. But surely we must base our deci-

sion-making on the best science we can find, because this is a scientific topic. And the science must be sifted, and put into perspective.

Thank you very much.

[Prepared statement of Thomas H. Jukes follows:]

PREPARED STATEMENT OF THOMAS H. JUKES, PH.D., DEPARTMENT OF BIOPHYSICS, UNIVERSITY OF CALIFORNIA, BERKELEY, CA

Mr. Chairman and Committee Members:

My name is Thomas Jukes. I am a professor of biophysics at the University of California, Berkeley, starting in 1963. I have a Ph.D. degree in biochemistry, and I also have worked in nutrition, vitamins and cancer chemotherapy. I received the Bruce F. Cain Memorial Award, 1987 for Cancer Research for my participation in work on methotrexate, the first compound that was successfully used to treat leukemia in children. My work on this was at Lederle Laboratories, 1947 to 1952.

I support the proposal of the committee to investigate environmental toxins and children's health. This needs careful scientific analysis because there have been recent panics. The fear of pesticides in foods is widespread. Actually, most foods tested have no detectable pesticide residues.

It is quite easy to arouse fear by telling parents that their children may be poisoned by their food. In 1989, it was announced by FDA that Chilean grapes were contaminated with cyanide. As a result, tons of perfectly good fruit were dumped into the garbage and the Chilean fruit industry was severely damaged. An Oregon highway patrolman stopped a school bus by requests of a frantic mother to remove a child's lunch containing grapes. The contaminated grapes that started the panic were found by the FDA to contain 3

micrograms of cyanide in each of two grapes. The amount of cyanide normally present in lima beans is 100 micrograms per gram.

I dwell on these figures because the illustrate the basic principle of toxicity that the dose alone makes the poison. We cannot evaluate exposure to environmental toxins, including carcinogens, without adhering to this principle. In the case of the grapes, it had been known for years that cyanide is naturally present in many foods, published in the book Toxicants Occurring Naturally in Foods by National Academy of Sciences in 1973, and in another book edited by me. Cyanide in small doses is eliminated harmlessly by the body in the form of thiocyanate. Big doses are intensely poisonous. A person would have had to eat sixty pounds of the contaminated Chilean grapes to get a poisonous dose, and the person would have burst. So it is easy for the media to panic the public over non-existent risk.

The use of pesticides in food production must benefit the consumer.

1. Pests are destroyed. Pests consume and contaminate crops. Molds grow on food and produce cancer-causing toxins. Molds are killed by fungicides, which are pesticides.

2. The yields of fruits and vegetables are increased. Fruits and vegetables are recommended by all leading health authorities as valuable for the prevention of cancer. Any

program that deprives children of fruits and vegetables is removing nutritionally important foods that prevent cancer.

What are the risks? It is encouraging that during the years 1940 to 1983, in which synthetic pesticides came into use, life expectancy has risen from 63.6 years to 74.6 years. Of course, many public health matters improved. Pesticide residues are not present in most foods. The California Department of Food and Agriculture tested over 14,000 food samples in 1988 and again in 1989. No residues could be detected in more than 70% of the samples, both years. Residues were less than 50% of legal limits in another 20% of the samples. The legal limits provide about a 100-fold margin of safety. Only one-quarter of 1 per cent had residues above the limits. These figures tell us that to protect our children, we should be spending our time on something different from pesticide residues. There are many important problems: Lead poisoning is one. I would list also passive exposure to cigarette smoke, fetal alcohol syndrome and malnutrition.

Next, I shall try to put the carcinogen problem into perspective. It is generally concluded that the incidence of cancer could be substantially reduced by improving the diet. This conclusion comes from comparing diets in different countries with incidence of various types of cancer. High-fat diets may be a cause. More fiber in the diet and more fruit and vegetables are strongly advised.

These conclusions are based on incidence of cancer in human beings.

Animal tests for carcinogens are of doubtful value, first because mouse tests don't agree with rat tests, so that both rat and mouse tests are unlikely to be meaningful for humans. Second, rat and mouse tests are made with very high levels of the test substance, and these high levels are so toxic that the tissue damage may lead to cancer. This was where the evaluation of Alar went astray. Professor Bruce Ames estimates that 50% of all chemicals tested, either natural or synthetic, will produce cancer at high levels.

Then there is the fact that the levels of carcinogens naturally present in the diet are thousands of times greater than residues of synthetic pesticides. Scorched or burned foods contain highly potent carcinogens in animal tests,, as shown by Takashi Sugimura. Plants produce toxic substances, some of which are carcinogens, to protect themselves against insects. There are lots of carcinogens always in food, and we protect ourselves against their effects by means of natural anti-cancer substances such as antioxidants. Of course, very large doses of carcinogens, such as cigarette smoke, alcohol or sunburn can overcome the natural means of protection.

> The Mayo Clinic Nutrition Letter, June 1989, said: America's food supply is abundant and generally quite safe, more so than in the past .... We

> believe hysteria over pesticide residues is unwarranted. The EPA [pesticide] residue limits are often set several hundred times lower than the level that caused no effect in test animals .... The results of [the FDA] 'market basket' study show that after cleaning, peeling and cooking, foods generally contain less than one-hundredth the amount of pesticide residues established by international organizations ... increasing your consumption of fruits and vegetables may lower your risk of developing some types of cancer .... In general you can feel confident in the safety of what you eat."

Alar and UDMH

On February 26, 1989, the TV program "60 Minutes" showed a red apple with a skull and crossbones, and the announcer stated that "the most potent cancer-causing agent in our food supply is a substance sprayed on apples." This TV program, which caused public panic nationwide, was based on data supplied by the Natural Resources Defense Council. I disagree with their conclusions, as follows:

Tests with Alar showed that it did not cause increased cancer in either mice or rats when fed at doses as high as 1% of the diet (10,000 parts per million). This information was released by EPA on February 1, 1989. The red apple on TV would have contained about 0.2 milligrams of Alar.

When food containing Alar is processed, Alar breaks down to UDMH and succinic acid. Succinic acid is a common food substance. The rate of breakdown was 5% to 9% in processed applesauce, with a top level of 44 parts per billion of UDMH. UDMH tested negatively for cancer in rats, and in mice was negative at 10 and 20 ppm in drinking water. Tumors were observed in 20% of animals that received 80 ppm, but 80% of the mice died prematurely, indicating that the minimum toxic dose had been exceeded. The tumors may have been caused by toxicity to the liver. NRDC said in their publication that "UDMH is the greatest source of the cancer risk [from pesticides] identified by NRDC." The levels of intake of UDMH (EPA, FDA and USDA data) are 1.6 microgram daily for a 20-kilo child. This would supply about 50 molecules per body cell. Each body cell normally contains several million molecules of carcinogens, such as cadmium, chromium and arsenic, because we are part of the solar system, plus several million molecules of steroid hormones. Put in another way, our normal intake of arsenic is about 1 milligram (1,000 micrograms) daily, and of cadmium, 200 to 500 micrograms daily. Both arsenic and cadmium are regarded as human carcinogens. We produce about 200 micrograms of steroid hormones daily. Extrapolation of carcinogenicity to such low levels is scientific nonsense, even if the biological tests were valid, which is obviously not the case.

California State health director Dr. Kenneth Kizer noted that giving up fruits and vegetables will surely result in more cases of cancer than would ever result from trace pesticide residues. Alar reduces the dropping of apples that rot on the ground and harbor pests, including molds. Molds on apples produce patulin, a suspected carcinogen.

NRDC declared on November 14, 1989, that "use of a chemical whenever the benefits outweigh the risks is absolutely anathema to the scientific community."

Actually, we spend much of our lives taking actions in which the benefits outweigh the risks. But Sanford Miller, a former director of FDA Bureau of Foods, reportedly said in 1990, "The risk of pesticide residues to consumers is effectively zero. This is what some 14 scientific societies, representing over 100,000 microbiologists, toxicologists and food scientists said at the time of the ridiculous Alar scare."

Major carcinogens in human cancer have been evaluated by Bruce Ames. He notes that more than 50% of 392 chemicals tested to date in rats and mice were found to be carcinogens at the highest doses administered. About half of the chemicals were synthetic and half were natural. Many natural pesticides have not been tested, and these are very numerous because they have been developed by plants as protection against fungi, insects and animal predators. We have not become resistant to natural poisons; examples are

alcohol and cyanide. Cell proliferation by high doses of toxic substances increases cancer incidence only at high dosage levels. Lead arsenate, which is toxic and carcinogenic, has been replaced by modern pesticides.

Dr. Richard H. Adamson, Director, Division of Cancer Etiology, National Cancer Institute, made the following statement on August 22, 1990:

> At the present time, I am unaware of evidence that suggests that regulated and approved pesticide residues in food contribute to the toll of human cancer in the US. Epidemiologic studies do suggest that certain herbicides and pesticides increase the risk for certain types of neoplasms in those persons who are heavily exposed to them, especially pesticide applicators.

Age-adjusted cancer mortality rates among white children ages 0 to 14 years, have decreased by 35% between 1973 and 1974 and 1985-1986. The rate of cancer deaths at all sites in 1973 was 5.6 per 100,000 and in 1986 was 3.6 per 100,000. The incidence rate for acute lymphocytic leukemia has increased from 2.4 in 1973 to 3.4 in 1980, but the mortality rate decreased from 1.4 in 1973 to 0.7 in 1986, possibly because of chemotherapy. Data are from the National Center for Health Statistics.

My conclusions regarding pesticide residues in foods are as follows:

(1) Analysis of foods show that in most cases pesticide residues were not detected, and in nearly all other cases, the residues were within tolerance limits. These findings show that the problem is a very minor one, regardless of other circumstances.

(2) A National Cancer Institute spokesperson on August 27, 1990 stated he was "unaware of evidence that suggested that regulated and approved pesticide residues in foods contribute to the toll of human cancer in the US."

(3) Various public health authorities agree that protection against cancer by fruits and vegetables outweighs any effects of pesticide residues.

(4) Plant protectant chemicals (pesticides) make a second contribution to prevention of cancer by destroying molds that produce carcinogens in foods.

(5) The "apple scare" was based on mouse tests for UDMH that were unreliable, incomplete and flawed by toxicity.

(6) The public is highly sensitive to scare stories about food, and scientists should at all times try to supply authoritative information on this topic.

California Dept. of Food and Agriculture, Pesticide Monitoring Program

	1988	1989
Samples taken	14,504	14,987
No residues detected, percent of samples taken in marketplace	76.1	77.9
Residues Less than 50% of tolerance, percent	19.6	21.4
Residues between 50 and 100% of tolerance, per cent	1.1	
Illegal residues		
(a) Pesticide not authorized for use as commodity	0.94	0.47
(b) Higher than tolerance level	0.21	0.24
Total	1.16	0.71
Produce destined for processing:		
Samples taken	997	1061
Illegal residue	1	4*
No detectable residue	>90%	>91%
"Organic" produce:		
Samples taken	198	
Pesticide residues detected	7	

*including residues of pesticides not authorized for use in the commodity tested.

Footnotes

1. The experiments on toxicology of UDMH were in some cases unreliable. The test animals were compared with controls run 7 years earlier. The drinking water containing the UDMH was changed only once in 2 or 3 days. UDMH decomposes in water to formaldehyde dimethylhydrazone. In an experiment with hamsters, the animals were "suffering from degenerative diseases". In another study (Haun et. al.) the test substance was not analyzed and it had a boiling point 30^{o} - 40^{o} C higher than that of UDMH.

2. No effect was detected in mice fed 10 and 20 ppm of UDMH. This dose is 22,000 times higher than the dose calculated by NRDC for children.

   The effects at higher levels (40 and 80 ppm) were "merely a consequence of severe liver toxicity" (Chaisson, C.F.) which interfered with catabolism of estrogenic steroids, thus causing tumors. Dr. Chaisson notes that "pre-puberty" animals would be expected to be less vulnerable, since the causative factor - the hormones -- would be more scarce.

   > "Since daminozide and UDMH do not cause genetic damage, an argument that exposure to low levels of these chemicals early in life would cause tumors later in life has no credibility. (If the liver is not damaged and no cellular genetic damage has occurred, no effect is expected at any point in life.)
   >
   > The tumors noted in these experiments are very rare in humans, but they have been found in females who have been treated for a long time with therapeutic levels of estrogens (very high levels of hormones) for other health problems. This again demonstrates that high levels of circulating hormones can cause the effects noted in the experimental animals."

   Her conclusion is that "at low levels of human dietary exposure UDMH and daminozide (Alar) do not pose a carcinogenic risk."

   I agree with her conclusion. UDMH is a good example of a threshold, below which there is no effect.

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THE ALAR SCARE, 1989

by Thomas H. Jukes
University of California, Berkeley

Using questionable science and credulous news media, the Natural Resources Defense Council (NRDC) frightened mothers into pouring apple juice down the drain and grocers into pulling fruit from their shelves.

On February 26, 1989, "60 Minutes" correspondent Ed Bradley warned on nationwide TV that "the most potent cancer causing agent in our food supply is a substance sprayed on apples to keep them on the trees longer and make them look better. That's the conclusion of a number of scientific experts...." This statement was untrue.

The TV screen showed an apple with a skull and crossbones on it. Alar was found non-carcinogenic in either mice or rats when fed at doses as high as 10,000 ppm (1% of the diet).

Alar (daminozide) is a plant growth regulant that is sprayed on apple trees to prevent early drop and to aid ripening of apples, especially red ones. It is classified as a pesticide by governmental regulations, not because it kills pests (which it does not). It is used on other crops to a lesser extent than on apples.

Chemically speaking, Alar is a compound of succinic acid joined to unsymmetrical dimethyl hydrazine (UDMH), which has the chemical formula $H_2N\text{-}N(CH_3)_2$. Succinic acid

$HOOC-CH_2-CH_2-COOH$, is a normal food substance that is formed in the body from glucose. UDMH is set free from Alar by cooking apple products in processing. Alar is not carcinogenic in animal tests, but toxic levels of UDMH have produced tumors in mice. Earlier tests of UDMH in mice were rejected by EPA's scientific advisory panel as being seriously flawed. Further experimental work on this effect of UDMH is in progress, and was regarded as incomplete by the EPA, although it was stated on February 1, 1989 by EPA that some of the mice fed 80 ppm of UDMH in the current experiments were dying early and developed cancer. EPA also stated simultaneously that "it may be argued that the deaths are the result of excessive toxicity, which may compromise the outcome of the study."

Hydrazines, derived from ordinary mushrooms, have been found to induce cancer in mice and hamsters. Regulatory decisions require sound scientific evidence, and this is not complete for UDMH.

Pesticide residues in foods are widely alleged to be carcinogenic, even though no case of cancer, and, for that matter, no major illness in a consumer attributable to pesticide residues in foods produced by approved methods has ever been recorded. There have been occasional occurrences of allergic illnesses caused by the use of sulfite as a fungicide on grapes and lettuce.

Anti-pesticidism has given rise to expansion of the organic food industry and to the professional involvement of

a host of lawyers, writers, politicians and full-time conservation activists. Anti-pesticidism has no factual or scientific basis and it is an ever-growing burden on the economy, mostly in the U.S. It has been a source of revenue and greatly increased membership for environmental organizations. Anti-pesticidism appeals to nostalgic longings for a bygone "pure state of nature" that never existed--the days of 1900 when life expectancy in the U.S. was 49 years as compared with 75 years in 1983.

Anti-pesticidism also arouses terrified feelings about poisoning of the food supply. Sensitivity to this issue was exemplified on March 15, when an Oregon highway patrolman stopped a school bus to remove grapes from a child's lunch at the behest of the frantic parent. This was a result of the FDA's March 14, 1989 ban on Chilean fruit, based on finding three micrograms of cyanide in each of two grapes. A one-gram lima bean normally contains 100 micrograms of cyanide (one milligram is 1,000 micrograms).

NRDC, Alar and UDMH

Modern marketing techniques, including the use of nationwide television and the collaboration of actress Meryl Streep, were highly successful in the latest horror story about residues in food.

In February, "60 Minutes" agreed to feature the NRDC in return for a promise that it withhold its report from other news organizations until after their broadcast. The news program announced that Alar, present in apples, "is the most

potent cancer-causing agent in our food supply." Since there is no firm evidence that Alar causes cancer in anything, the announcement was false, but NRDC explained later that a breakdown produce of Alar, UDMH, would cause cancer in children who ate apple products. The story was reinforced in television appearances by Streep and panic started. There was a national dumping of apples and apple juice into the garbage.

Since the story emphasized cancer in children, public schools across the country stopped giving apples and apple products to students. The NRDC story flatly contradicted EPA and FDA rulings, but this was used by NRDC to tell the public that, in contrast to environmentalists, government agencies cannot be relied upon to protect the public. One NRDC headline proclaimed "Massive public health problem ignored by Federal agencies." The newspapers had a week-long field day in March when they dispensed advice from the NRDC on the useless and unnecessary procedure of washing lettuce and cabbage with soap and water, and on where to buy organic foods. Newspaper cartoonists wittily showed teachers refusing gifts of apples from schoolchildren. During this time there were few efforts to on the part of the media to stem the hysteria or to present scientific facts.

But the media's heyday came to a halt on March 16, 1989, when a joint statement was made before Congress by the FDA, the EPA and the USDA that it was safe to eat apples

"despite claims [by the NRDC] to the contrary." California's state health director, Dr. Kenneth Kizer, announced that giving up fruits and vegetables "will surely result in many more cases of cancer, as well as heart disease and other chronic conditions, than would ever result from trace pesticide residues."

Evaluating the Charges

How should we evaluate the charges made by the NRDC of a hazard from apples? It is the responsibility of all of us to protect the health of children, but we should not be overcome by sensational publicity in making evaluations.

In its February 1989 summary report, the NRDC gives the "preschooler's average exposure" (children aged one to five years) to UDMH as 0.082 micrograms per kilo of body weight per day. The NRDC states that no range of values is necessary for UDMH "because comprehensive residue data were available." The intake for a 5-year-old, with a weight of 20 kg (bodyweight estimated from National Academy of Sciences data) would be 1.6 microgram, containing 10^{15} X 5 molecules of UDMH, corresponding to 50 molecules per body cell. Dinman has calculated (Science 175:495, 1972) that "a threshold for biological activity in a cell in 10,000 molecules. This is based on the presence of too many common interfering materials in the cell for an introduced substance to have an effect at levels below such a threshold. These common materials include known carcinogens such as cadmium, 1,000,000 atoms of which are normally

present per liver cell." I conclude that UDMH--0.082 microgram per kilo of body weight, cannot be hazardous--that NRDC is scientifically incorrect, that the NRDC has caused needless and irretrievable alarm, and that extrapolation to such very low levels is meaningless.

The apple shown on TV, if it were a 200-gm Red Delicious, would have contained about 0.2 milligram of non-carcinogenic Alar and 0. 33 microgram of UDMH.

Evaluation of Cancer-Causing Substances

Animal feeding tests--usually lifetime studies--are used to measure cancer-causing properties of chemicals. Because of the dose/response relationship, it would take millions of animals to obtain any results with the very low levels of residues that are found in food, so large amounts are fed to a fairly small number of test animals.

The number of cases of cancer is related to the levels fed by a dose-response curve. This curve is extrapolated back to the small amounts, such as 1 part per million, of the chemicals that are present in foods. The extrapolation may not be valid, because frequently the levels tested produce acute toxicity that would not occur in "real life." Dr. Bruce Ames points out that acute toxicity greatly increases the mutation rate. This system of testing is questionable, because it assumes that people are like mice, and the dose-response curve is a straight line, neither of which may be true. There are marked differences in response to the same compound, even between mice and rats, as shown

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by UDMH, and, of course, human beings may be even more different.

Carcinogens in Foods

To assess the importance of UDMH residues, we must evaluate them against the background of "carcinogens" occurring naturally in foods. A comprehensive review by E.C. and J.A. Miller in Biochemistry of Nutrition, 1979, included descriptions of aflatoxins produced by molds, of hydrazines present in edible mushrooms, of nitrosamines formed from nitrites in the saliva, and of many other compounds. The authors emphasized the high potency of aflatoxins and their presence in grains and peanuts. Also, in 1979, a Japanese scientist, T. Sugimura, found that toasting, charring or burning (pyrolysis) of foods in ordinary cooking produced chemicals of very high potency as mutagens, and he later found that they caused cancer when fed to rats. His research highlighted pyrolysis as producing previously unknown carcinogens in foods, in addition to the benzopyrenes which had been known for some time as being formed during barbecuing of meat.

Intensive and quantitative evaluations of carcinogens were made by B.N. Ames (Science 216:271, 1987) and his collaborators beginning in 1983. Their most recent calculations include the rests of tests with rats and mice, the daily human exposure and the possible hazard expressed as "Human Exposure Rodent Potency Index" (HERP). A few examples of possible hazards stated as HERP values are: 1

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liter tapwater, 0.001 (containing 83 micrograms of chloroform), 6 ounces of apple juice containing UDMH, 0.0017, 1 peanut butter sandwich, 0.03 (0.064 microgram aflatoxin), 1 raw mushroom, 0.1 (hydrazines), 1 gram dried basil leaf , 0.1 (3.8 milligrams estragole).

I regard the threshold principle as being a "law of nature." Consequently, below a certain level of intake, so-called carcinogens will not produce cancer, because of reasons given by Dinman explained earlier and also because of the presence of anticarcinogens and DNA repair mechanisms that cope with small amounts of carcinogens.

Ames's new approach was greeted with hostility by environmental activists and militant consumerists such as Sierra Club employee Carl Pope, who said that the appointment of Ames to the California Governor's scientific advisory panel on toxic substances was an "act of sabotage." It seemed that environmentalists regarded carcinogenicity as a lucrative political issue rather than as one to be evaluated scientifically. A similar viewpoint was blatantly stated by Consumers Union in Consumer Reports (May 1989):

> "The risk from UDMH has many features that make it less acceptable to consumers than other far larger risks that we live with daily .... It's not like radon gas seeping through the basement floor or aflatoxin in peanuts, since UDMH is in foods by human hands, not Nature's ... and unlike many risks, this one falls disproportionately on

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children. For all these reasons, not because it's a big risk [emphasis added] we find Alar in food intolerable."

Radon gas and aflatoxin can both be lowered by human intervention, but according to Consumers Union, it is not the magnitude of a risk, it is whether or not it is socially acceptable, that decides whether it is tolerable.

Ames's approach has been not to alarm consumers with accounts of "natural" carcinogens in foods, but rather to point out that these have far higher carcinogenic potency in the amounts commonly consumer than do the traces of pesticide residues actually present in foods. He lists anticarcinogens such as carotene, selenium and glutathione in foods that protect against carcinogens., His recommendation is to set priorities on the major hazards such as tobacco (350,000 deaths per year) and alcohol.

Organic Food

The term "organic farming" was introduced in 1942 by a New York electrical contractor, J.I. Rodale, to describe farming in which manure was used instead of inorganic chemical fertilizers, thus reviving a superstition that had been destroyed in the early 1800s by the German chemist Justus von Liebig. Liebig showed that inorganic fertilizer and barnyard manure both furnish inorganic ions, especially potassium, phosphate, and nitrogen as nitrates or ammonia, and that these ions are the major essential elements for plant growth. Rodale's superstitious pleading for manure

and compost in his Prevention magazine appealed to many of the urban public, who knew nothing about farming, and he added more color to his definition of organic farming by excluding chemical pesticides and other scientific procedures from it., Organic food, of course, is produced only by organic farming.

In March, the NRDC recommended organic food as a "healthy" substitute for apples and other foods that had been treated with Alar or fungicides. Some years ago, in hearings on organic foods by the New York State Attorney General, a report by the state chemist revealed t hat organic foods contained, on average, higher pesticide residues than foods purchased randomly at supermarkets. The state chemist also found that organic foods contained residues of seven different pesticides and cost an average of 113 percent more than their "regular" counterparts.

Organic produce tends to be of low quality (although highly priced) because of pest infestation, and the NRDC paid homage to this in March 1989 by advising consumers to reject fruit that looked "too perfect." It also advised parents to supply their children with "organic apple juice," which has been reported in one survey to contain up to 45 ppm of patulin, produced by molds, and suspected of being a carcinogen. The superior quality of conventionally produced fruits and vegetables is termed a "cosmetic effect" by promoters of organic food and by the NRDC. "Cosmetic effect" includes the absence of insects and molds and the

presence of fruit. Health food stores are an adjunct of the organic food industry.

In an April 1989 article in the Washington Post, M. Gladwell pointed out that the complicated scientific issue of Alar was decided "not by officials charged with protecting the public on the basis of hard evidence, but by a frightened public acting on incomplete and often erroneous press reports." He also noted that food companies had proclaimed that their products were Alar-free, thus dealing "with the Alar issue as a marketing problem rather than a scientific one." As a result, "the prospects of winning any future battles over the use of pesticides will be much slimmer." This statement was reiterated in an April 1989 Wall Street Journal article: "We're dealing with perceptions here, we're not dealing with reality."

Yet, facts alone are not enough. In The Coercive Utopians, Rael Jean and Erich Isaac wrote about those environmentalist groups who seek to impose their notions on others "because they assume that man is perfectible and the evils that exist are the products of a corrupt social system."

Such groups admit that carcinogens occur in nature but these don't concern them. It's man-made chemistry that really bothers them.

The food supply in the U.S. is the best, the safest and the most varied in the history of the world. A visit to the Soviet Union, for example, is a salutary experience for

"food appreciation." We should do our best to help the ever-increasing food needs of other countries, especially less developed countries.

Chairman MILLER. Thank you. Ms. Mott?

STATEMENT OF LAWRIE MOTT, M.S., SENIOR SCIENTIST, NATURAL RESOURCES DEFENSE COUNCIL, SAN FRANCISCO, CA

Ms. MOTT. Good morning. I am Lawrie Mott, a Senior Scientist for the Natural Resources Defense Council. I will respond to some of the things that Dr. Jukes has brought up in short order, but I would like to still continue with my testimony that I had planned.

First and foremost, I think today that we should look at what we now have in the way of evidence on childhood health, and what effects the children are now risking from exposure to toxins. According to the National Cancer Institute, the incidence of childhood cancer is up 21.5 percent since 1950.

Now, there is a big difference between incidence and mortality statistics. Dr. Jukes has pointed out that the mortality statistics are down. That is the good news. That shows that our medical care system is making substantial progress in treating cancer. But we are regrettably not making enough progress in terms of preventing cancer. And that is really what we need to be focusing on.

You heard this morning about some of the cancer clusters here in California. And you heard again that science cannot provide all the answers about what the causes of those cancer clusters are. That is unfortunate. But that does not mean the Government should not place controls on some of the compounds that we know from animal studies to be carcinogenic.

Another statistic about childhood disease and exposure to toxins. Childhood asthma; hospital admission rates doubled between 1973 and 1987. There are scientific studies that have correlated indices of air pollution with asthma morbidity in children. Clearly, again, we have early indications that environmental exposure to toxins are causing serious problems for our children.

Yes, we need more research, and disease monitoring, to better understand the correlation between disease and exposure to toxics. But in the meantime, what you have heard continuously this morning is that our children are being exposed to these chemicals in the environment. And they are being exposed at greater rates than adults are.

This means that children are at the greatest risk. They are the members in our society that are at greatest risk for exposure to toxins.

One illustration of that is our report, NRDC's report, Intolerable Risk, that came out last year. We looked only at pesticides. Only at pesticides in food. We looked only at 27 of the more than 300 pesticides that can be present in food.

Let me tell you some of our findings. We found that between 5,500 and 6,200 of today's preschoolers could develop cancer at some point in their lifetimes just as a result of exposure to eight carcinogenic pesticides. We found that these risk levels were 240 times what EPA considered acceptable. We also found that 50 percent of the child's cancer risk could occur just from exposure to these compounds in their first six years of life.

I would now like to respond to some of the things that Dr. Jukes brought up. First, NRDC has never suggested that the answer to

the issue of pesticides in food is for parents or their children to stop eating fresh fruits and vegetables. The answer is for our Government to have much stronger control on the levels of these chemicals in the food supply.

Second, I would like to speak specifically to the issue of the evidence of the carcinogenicity of Alar. In spite of the evidence that Dr. Jukes brought up this morning, the National Toxicology Program, the International Agency on Research of Cancer, even the EPA, still today classify Alar and its metabolite, UDMH, as a probable human carcinogen. That is the strongest classification short of positive evidence in humans that the chemical is carcinogenic.

And third, I would like to speak to the issue of natural carcinogens in food. And even natural carcinogens throughout our environment, natural toxins. Yes, they are there. The reality is there is very little that we can do, short of voluntary measures, to avoid exposure to some of these chemicals. We cannot avoid the natural constituents in mushrooms, or any of the other foods. So we have no choice in the case of chemical contaminants, where the exposure is involuntary, for the Government to regulate these kind of things.

The NRDC report illustrated that children not only are at greater risk, but their exposure rates are higher because they eat more certain foods at the percentage of their body weight. This is not just true of food. It is also true of drinking water and air. You have heard a little bit about it this morning.

To give you some examples. Children drink more water as a percentage of their body weight than adults. For example, infants that are under one, and children under the age of six, drink five to three times, respectively, greater water than adults, relative to body weight.

In terms of breathing rates, again, the young, an infant at rest passes two times as much air through its lung as compared to a resting adult.

You have also heard a little bit this morning about how children may be physiologically more susceptible to the exposure to toxins. They report a variety of examples. Included among them are the fact that the human nervous system is still developing for quite a long time after birth.

Children, early exposures in life to carcinogens may carry greater significance, because children are growing and their cell division rates are much higher. Also, the simple statistical fact that children are likely to live a lot longer than all of us. And so therefore, they are more likely to live out any latency period between exposure to carcinogen and when its ill effects will manifest themselves.

There is also scientific evidence that serious sunburns early in life increase your likelihood of skin cancer later on in life.

Contrast this scientific evidence with the Government's track record on this problem. Clearly, the Government has failed to protect our children. This morning you heard about Alar, you have heard about Aldicarb. I would like to bring up a couple of points about both of those chemicals to demonstrate the Government's bad track record in this area.

In the case of Alar, it was not EPA who took this chemical off the market. It was the manufacturer who took the chemical off the

market. To me, that is the most clear symptom of the Environmental Protection Agency's failure to protect us from pesticides in foods. I think it is illustrative of the other chemicals that the Agency regulates.

Now, let's talk about Aldicarb. One of the issues you have heard about is the food exposure, the presence of this chemical in food. And Dr. Jackson spoke to the new method that EPA has before it about the number of children each day that are being exposed to unsafe levels of Aldicarb.

The original estimate that the Agency had was up to 81,500 children each day are being exposed to unsafe levels of Aldicarb, from consumption of potatoes alone. The Agency required the manufacturer to conduct new studies, and the new studies indicated that those numbers were way lower than they should be.

But the sad truth is that we are not getting Aldicarb just in our food. We are also getting it in our drinking water. And again, both the EPA, and here in California the State Government, has failed to protect us from these exposures. In fact, in California there is a good law on the books to prevent pesticide contamination of groundwater, and the State Government has failed to enact that law adequately.

And just yesterday, NRDC, along with some other individuals in other organizations in the State, filed a lawsuit to stop the use of Aldicarb, because it is continuing to contaminate drinking water wells in this State.

Are there solutions? Yes. We need more research, scientific research. We need more monitoring of childhood disease. We need more monitoring of exposure to environmental toxins.

But one of the fundamental solutions that could be implemented right away is to require that when State and Federal Government Health Agencies set standards to allow exposure to toxic chemicals, that they explicitly consider children in those standard-setting processes.

Right now, in Congress there is legislation, the Food Safety Amendment, introduced by Congressman Waxman and Senator Kennedy, that would require when pesticide residue levels are set for food, that children are explicitly considered. The bad news is that I fear preemption may be the price to pay for passing that legislation in this Congress. That is too high a price.

Especially because here in California we have a very important opportunity coming up this November to enact legislation that will establish, require standards when they are set for pesticides in food, that they explicitly consider and protect children. And I am referring here to Proposition 128, or better known perhaps as the "Big Green."

This initiative will do many things. But in the area of pesticides, in my mind one of the most important aspects is that it requires that children are protected when pesticide residue levels are set. And this is the first time ever, if this law passes—and the chances for passage are very good—this is the first time ever in this country that we could have that kind of standard. I think that would send a very strong message to the rest of the nation.

I will conclude my remarks here. I would just like to say that I am very pleased that the committee is taking interest in this issue.

It is a very important one. And later this fall, NRDC will be starting a new project that will explicitly look at the range of environmental threats to children's health. And we would be happy to work with the committee in any of your efforts, and we will keep you apprised of our progress in this area.

Thank you.

[Prepared statement of Lawrie Mott, M.S., follows:]

PREPARED STATEMENT OF LAWRIE MOTT, M.S., SENIOR SCIENTIST, NATURAL RESOURCES DEFENSE COUNCIL, CHILDREN'S HOSPITAL, OAKLAND, CA

Good morning. I am Lawrie Mott, Senior Scientist with the Natural Resources Defense Council (NRDC), a national nonprofit organization dedicated to protection of public health and the environment. In February 1989 NRDC issued Intolerable Risk, the first study to quantify the risks to children from actual levels of pesticides in food. Since then, we have examined the threats posed to children from other environmental hazards as well.

I. Environmental Threats to Children

It is well known that the nation's children face unprecedented challenges and burdens as we enter the twenty-first century. Increasing poverty, drug and alcohol addiction, malnutrition, faltering schools, and a host of other social and economic ills are sad realities confronting many children today.

The young face another problem, perhaps less publicized, but also tragic: threats to their health and future due to increasing contamination of the environment. Particularly disturbing is the documented increase in serious diseases among children, which may, in part, result from exposure to ambient pollutants. The incidence of childhood cancers increased 21.5% since 1950, according to the National Cancer Institute.[1]

A number of clusters of childhood cancers potentially linked to toxic pollutants have been documented in recent years. For instance, in Woburn, Massachusetts, an increased incidence of

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1 National Cancer Institute, 1987 Annual Cancer Statistics Review, NIH Publications No. 88-2789, Chapters on Trends and Incidence (1988). Among the whole population, cancer rates (adjusted for changes in age distribution and excluding lung cancer) rose 22.6% since 1950.

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childhood leukemia and other diseases was significantly correlated with consumption of drinking water contaminated by toxic chemical dumping.[2] Here in California, the towns of McFarland, Fowler, Earlimart and Rosamond have also been identified as having unusually high rates of childhood cancer. It may never be possible to identify the causes of these cancer clusters but environmental factors are suspect.

Childhood asthma is also on the rise. According to a recent study, hospital admission rates for asthma among children doubled between 1973 and 1987.[3] The causes of this increase are not known, but environmental factors are among those that have been implicated.[4] For example, several epidemiological studies show a correlation between indices of air pollution and asthma morbidity in children.[5]

II. Children's Exposure to Harmful Pollutants

Although more research and better health monitoring must be done in order to understand the relationship between the rise in disease incidence and environmental degradation, we do know that children are being exposed on a daily basis -- by drinking water,

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2 Marshall, E., "Woburn Case May Spark Explosion of Lawsuits," Science, 234:418 (1986).

3 Richards, W., M.D., Hospitalization of Children with Status Asthmaticus: A Review, Pediatrics, 84:111-118 (1989).

4 Ibid.

5 Richards, W., et al., Los Angeles Air Pollution and Asthma In Children, Annal of Allergy, 47:348-354 (1981).

eating food, breathing air, and engaging in other normal human activities -- to a vast array of environmental pollutants, many of which are known to cause cancer and other serious diseases.

Children consume a variety of foods contaminated with toxic pesticides, many of which can cause cancer, birth defects or genetic mutations. Pesticide residues have been detected by a 1988 Food and Drug Administration (FDA) survey in over a third of all grain and grain products, in 19% of milk, dairy products and eggs, in over 48% of fish, seafood and meats, in over 45% of fruits, and in over 38% of vegetables.[6] Moreover, as documented in NRDC's 1989 report, Intolerable Risk, children are being exposed above safe levels to residues of a host of harmful pesticides, many of them cancer-causing or neurotoxic, in some of the foods they consume daily. A graphic example, according to a 1989 U.S. Environmental Protection Agency (EPA) staff report, is the daily exposure of an estimated 27,000 to 82,000 infants and children to higher than safe levels of the acutely toxic pesticide aldicarb just from consumption of potatoes.[7] Since that time, EPA has received new data indicating that the amount of aldicarb in the food supply is higher than previously thought and hence children are at even greater risk.

Half of all American families rely on groundwater as the source of drinking water, but in many states groundwater is

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6 FDA Pesticide Program, Residues in Food -- 1988 (1989).

7 EPA, Issue Paper -- Dietary Risks Associated With Aldicarb -- Draft (January 12, 1989).

contaminated with harmful substances. Forty-six different pesticides have contaminated groundwater in 26 states as a result of routine agricultural use.[8] Ethylene dibromide (EDB), a pesticide banned in the United States due to its carcinogenicity and reproductive toxicity, has been detected in about ten percent of Florida's drinking water wells, and more than a thousand wells have been closed due to the contamination.[9] On Long Island almost 2,000 wells have been contaminated by the neurotoxic pesticide aldicarb.[10] Groundwater is also being threatened with contamination by a variety of other hazardous substances through such activities as garbage and hazardous waste disposal and leaking underground storage tanks.

As ambient pollution of the environment continues at an alarming rate, children are also continuously exposed to harmful pollutants in other media. In 1988, for example, American industries released 22 billion pounds of more than 300 different toxic substances to air, water and land.[11] As documented in a recent NRDC study, billions of pounds of cancer-causing chemicals are released each year into the air alone.[12] The risks posed by

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8 EPA, Pesticides in Ground Water Base -- 1988 Interim Report (1988).

9 EPA, Office of Pesticides and Toxic Substances, Agricultural Chemicals in Ground Water: Proposed Pesticide Strategy (December 1987).

10 Ibid.

11 EPA, The Toxics Release Inventory -- A National Perspective (June 1989).

12 NRDC, A Who's Who of American Toxic Air Polluters (1989).

breathing this toxic air pollution are compounded in many areas of the country by unhealthful levels of ozone smog, to which over 100 million Americans are subjected.

Indoor air is also an important source of exposure to toxic air pollutants for children. As many as twenty to 150 hazardous chemicals can be found in typical American homes, often in much higher concentrations than those found in outside (ambient) air. We spend over ninety percent of our time inside, seventy percent in the home; some infants and young children may spend virtually all of their time indoors. EPA recently reported to Congress that indoor air pollution (excluding exposure to radon) may cause as many as 6,000 excess (lung) cancer deaths annually.[13]

Many family homes and other buildings occupied by children are contaminated with toxic substances, particularly carcinogens. According to EPA, as many as one in five houses may have unsafe levels of radon, a naturally occurring cancer-causing gas. EPA estimates that exposure to radon alone could cause up to 20,000 excess lung cancers per year.[14] In addition, up to 700,000 public and commercial buildings and 44,000 schools contain cancer-causing asbestos that may require removal.[15]

Depletion of the earth's protective stratospheric ozone layer, caused by emissions to the air of chlorofluorocarbons and

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13 EPA, Report to Congress on Indoor Air (1989).

14 Ibid.

15 Ibid.

other ozone-depleting compounds, is proceeding at a rapid rate; according to EPA, between 163 million and 308 million excess cancers could occur in people alive today or born before the year 2075 in the United States alone if nothing is done to halt ozone depletion. About 3.5 to 6.5 million of these cases would be fatal. More UV radiation would also cause an estimated 19 to 29 million additional cases of cataracts in this population. There could also be sharp increases in the number and variety of serious immunological disorders.[16]

III. Why Children are at Greatest Risk

Of all members of society, children are most at risk from the harmful effects of this ambient pollution. Children's greater exposure than adults to disease-causing toxic substances is vividly illustrated by statistics on their differential exposure to cancer-causing and neurotoxic pesticides studied by NRDC in Intolerable Risk.[17] NRDC found that children (ages 1-5) received up to twelve times greater exposure than women (ages 22-30) to certain pesticide residues found on fruits and vegetables. This is because children typically consume substantially more produce than their mothers proportional to their body weight -- for certain fruit juices, as much as 18 times more. Intolerable

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16 EPA, Costs and Benefits of Phasing Out Production of CFC's and Halons in the United States, Exhibit 5-1 and 5-1(b), pp. 5-8, 5-9 (Review Draft, Nov. 3, 1987).

17 NRDC, Intolerable Risk: Pesticides in our Children's Food (1989).

Risk further documented children's greater susceptibility to the effects of certain carcinogenic and neurotoxic substances due to the immaturities in their developing systems. NRDC estimated that as many as 5,500 to 6,200 of the nation's preschoolers may develop cancer sometime during their lives solely as a result of preschooler exposure to eight pesticides or metabolites at levels commonly found in fruits and vegetables. In addition, NRDC predicted that at least 3 million of today's preschool children may be receiving exposures to neurotoxic insecticides at levels above those the federal government considers safe.

The greater exposure of children to toxic substances is further exemplified by current widespread exposures to lead and other heavy metals. The U.S. Department of Health and Human Services recently estimated that despite dramatic reductions in lead in certain environmental media, notably air, 17% of metropolitan children are being exposed to harmful lead levels.[18] Although many poor, inner-city children are at high risk, the problem affects large numbers of more affluent children as well. The largest single source of this exposure is peculiar to children alone: young children ingest lead in chipping interior paint, which is found in an estimated 21 million homes nationwide.[19] As a result of their potential exposure to lead in paint alone, an estimated 12 million young children could suffer

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18 Agency for Toxic Substances and Disease Registry, The Nature and Extent of Lead Poisoning in Children in the United States: A Report to Congress (July 1988).

19 Ibid.

diminished intellectual capacity, behavioral problems and a variety of other serious mental deficiencies.[20] In addition, prenatal exposures to low levels of lead, primarily through contamination of drinking water, could endanger the normal development of over 400,000 fetuses each year.[21]

Major changes affecting the global environment, such as stratospheric ozone depletion, may also disproportionately affect children. For instance, the young are likely to be at greater risk of developing skin cancers later in life from increased exposure during childhood to radiation penetrating the thinning ozone layer.[22] The impacts of global warming will also disproportionately affect the children of today -- and their children -- but for a different reason: the worst effects are expected to be felt after the turn of the century.

Children are at greater risk from the harmful effects of ambient pollutants both because they receive greater exposures to many environmental contaminants and also because physiological immaturities in their developing system can render them especially susceptible to the toxic effects of this exposure. Children receive greater exposure to ambient pollutants simply

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20 Ibid.

21 Ibid.

22 Basal cell and squamous cell carcinoma of the skin and malignant melanoma have all been associated with excessive sun exposure with exposures during childhood and adolescence of particular concern. William, M.L. and R.W. Sagebiel, M.D., "Sunburns, Melanoma, and the Pediatrician, Commentaries," Pediatrics, 84:381-382 (1989).

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because proportionate to their size they eat more food, breathe more air, and drink more water.

- The young, for example, have twice the caloric needs of adults[23] and relative to their weight, eat more of most foods, particularly fruit.[24] This greater consumption rate results in greater exposure to contaminants in food. EPA has estimated, for example, that dietary exposure to pesticide residues are "invariably highest in the infant and child subgroups."[25]

- Children also ingest more drinking water. Infants (<1 year) and children (ages 1-6) are estimated to ingest approximately five and three times, respectively, as much total water and approximately twice as much tap water as adults relative to weight.[26] The young, therefore, receive proportionably greater exposure to drinking water contaminants.

- The young also have higher breathing rates. Approximately twice as much air passes through the lungs of a resting infant compared to a resting adult.[27] As a result, twice as much of any chemical in the atmosphere reaches the lungs of the infant. Children are also much more active than adults,

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23 Behrman, R.E., M.D. and V.C. Vaughan, III, M.D., Nelson Textbook of Pediatrics, 12th Edition, W.B. Saunders, Co., 1983.

24 NRDC, Intolerable Risk, supra, note 17.

National Academy of Sciences, Regulating Pesticides in Food: The Delaney Paradox, Appendix B, Washington, D.C. 1987.

25 Saunders, S., Briefing Paper on the Tolerance Assessment System For Presentation To The FIFRA Science Advisory Panel, EPA, Office of Pesticide Programs, p. 33 (February 1987).

26 Ershow, A.G. and K.P. Cantor, Total Water and Tapwater Intake In the United States: Population-Based Estimates of Quantities and Sources, National Cancer Institute, Order #263-MD 810264 (May 1989). Total water includes both tapwater and intrinsic water contained in foods and beverages at the time of purchase. Tapwater includes water consumed directly as beverage and also added to food and beverages during preparation.

27 World Health Organization, Environmental Health Criteria 59. Principles for Evaluating Health Risks from Chemicals During Infancy and Early Childhood: The Need for a Special Approach, Geneva (1986).

with breathing rates -- and consequently exposure to any contaminates in the air -- increasing during activity.

- Finally, the young have proportionately two and a half times the skin surface area of adults[28] and so can incur greater exposure to contaminants absorbed through the skin while showering or bathing.

In addition to receiving greater exposure, immaturities in their physiological development can render the young more susceptible to the toxic effects of certain environmental contaminants. For example, the human nervous system is still developing rapidly for several years following birth and is not completely mature until adolescence.[29] It is thought that this protracted period of maturation contributes to the sensitivity of the developing brain to various neurotoxins.[30] The young are also especially vulnerable to the effects of many carcinogens released into the environment, principally those that act at the initial stage in the cancer process.[31] Cancer is a multi-stage

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28 Ibid.

29 Ibid.

30 Reiter, L.W., "Age Related Effects of Chemicals on the Central Nervous System," in Hunt, V.R. et al., eds., Banbury Report 11, Environmental Factors in Human Growth and Development, Cold Spring Harbor Laboratory (1982).

31 Vesselinovitch, S.D., et al., "Aflatoxin B_1, a Hepatocarcinogen in the Infant Mouse," Cancer Res., 32:2289-2291 (1972).

Vesselinovitch, S.D., "Perinatal Hepatocarcinogenesis," Bio. Res. in Preg. and Perinatology, 4:22-25 (1983).

Vesselinovitch, S.D., et al., "Conditions Modifying Development of Tumors in Mice at Various Sites by Benzo(a)pyrene," Cancer Res., 35:2948-2953 (1975).

(continued...)

disease, and the first step -- known as initiation -- typically occurs when a carcinogen interacts with genetic material causing a mutation. The young are particularly vulnerable to this first step because cells are dividing rapidly during infancy and early childhood. There is greater probability that a permanent mutation will occur and that the cancer process will begin during periods of rapid cell division.[32]

The young are also more vulnerable to so-called "initiating" carcinogens simply because they have a long future life during

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Vesselinovitch, S.D., et al., "Carcinogenicity of Diethylnitrosamine in Newborn, Infant and Adult Mice," J. Cancer Res. Clin. Oncol., 108:60-65 (1984).

Naito, M., et al., "Effect of Age at Treatment on the Incidence and Location of Neurogenic Tumors Induced in Wistar Rats by a Single Dose of N-ethyl-n-nitrosourea," Gann, 72:569-577 (1981).

Mulvihill, J.J., "Ecogenetic Origins of Cancer in the Young: Environmental and Genetic Determinants," in Levine, A.S., ed., Cancer in the Young, Marson Publishing (1982).

32 Vesselinovitch, S.D., et al., "Neoplastic Response of Mouse Tissues During Perinatal Age Periods and Its Significance in Chemical Carcinogenesis," Perinatal Carcinogenesis, National Cancer Institute Monograph 51 (1979).

Chan, P. and T.L. Dao, "Effects of Dietary Fat on Age-dependent Sensitivity to Mammary Carcinogenesis," Cancer Letters, 18:245-249 (1983).

Laib, R.J., et al., "The Rat Foci Bioassay: Age-Dependency of Induction by Vinyl Chloride of ATP-Deficient Foci," Carcinogenesis, 6:65-68 (1985).

Chang, M.J., et al., "Interrelationships Between Cellular Proliferation DNA Alkylation and Age as Determinants of Ethylnitrosourea-Induced Neoplasia," Cancer Letters, 39-45 (1981).

which cancers begun in childhood can develop.[33] In fact, most of the cancer risk that an individual receives from many environmental carcinogens may be from exposures in the very first years of life. For instance, serious sunburns in childhood, the likelihood of which will be greater for today's children and future generations due to depletion of the protection ozone layer, can increase the risk of skin cancer later on.

Children's proportionately greater exposure to many pollutants is compounded by the fact that they often receive simultaneous exposures to the same toxicant from a number of sources. For example, aldicarb, the most acutely toxic pesticide registered for use on food in the United States, has been detected in groundwater in 48 counties of 16 states and at levels in excess of health advisories in 25 counties of 11 states.[34] Aldicarb is also a residue in food. Thus, children's risk from this highly toxic substance is increased by multiple exposures to it through both drinking water and food.

As described above, children also experience multiple exposures to lead and other toxic heavy metals. For instance, they may be exposed to lead not only by eating chips of lead-based paint, but also by breathing polluted air, drinking lead-contaminated water, and eating certain foods purchased in lead-

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33 Day, N.E. and C.C. Brown, "Multistage Models and Primary Prevention of Cancer," J. Natl. Cancer Inst., 64:977-989.

34 EPA, Preliminary Determination to Cancel Registrations of Aldicarb Productions and Notice of Availability of Technical Support Document, 53 Fed. Reg. 24634 (June 29, 1988).

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soldered cans. Similarly, a large segment of the United States population is estimated to be exposed to the carcinogen benzene, primarily through breathing contaminated air but also from ingestion of contaminated drinking water, contaminated foods and from inhalation of cigarette smoke.[35]

IV. Government's Failure to Protect Children from Environmental Threats

Despite children's greater exposure and increased vulnerability to many ambient pollutants, government has consistently failed to control toxic chemicals and pollutants based on children's exposure levels. For instance, EPA has set legal limits for the vast majority of pesticides currently on the market without regard for children's greater consumption of most foods. In fact, the majority of current limits have been set based on average population consumption statistics collected in the 1950s and 1960s. Known as food factors, these estimates underestimate preschooler consumption of most commodities, in some cases by as much as 500 to 1,400 percent.[36] In 1986, EPA instituted a sophisticated program known as the Tolerance Assessment System (TAS) which allows the Agency to estimate dietary exposures to numerous subgroups, including infants and young children. Despite the availability of TAS, EPA continues to assess most dietary hazards and set legal limits for new

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35 Agency for Toxic Substances and Disease Registry, Toxicological Profile for Benzene, Draft (March 7, 1988).

36 NRDC, Intolerable Risk, supra, note 17.

pesticides and those undergoing registration based on average adult exposure.

Drinking water standards are also set by EPA to protect adults without taking into account the actual water consumption levels for children. In fact, EPA typically sets standards to protect the 70 kilogram adult who consumes and estimated two liters of water per day or an assumed consumption rate of 0.03 liters per kilogram (L/kg) of body weight. This approach may not adequately protect infants who consume, on average, 0.05 L/kg of tap water, nor 1-3 year olds whose average consumption is 0.046 L/kg.[37]

In addition, when setting standards, EPA frequently fails to account for exposure to the same chemical from other media. For example, when setting legal limits for pesticides in food, EPA does not consider that exposures to the same chemical come from other media such as groundwater, lawns, or around the home.

Childhood vulnerabilities are often not adequately accounted for in the regulatory process. The data used in most standard setting comes from studies on experimental animals in which exposure does not begin until after early childhood -- the period of potential greatest susceptibility -- has ended. Several recent studies indicate that the margin of safety traditionally

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37 Ershow, A.G., and K.P. Cantor, Total Water and Tapwater ntake, supra, note 26.

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assumed by EPA may not be adequate to protect the young.[38] For example, EPA's traditional risk assessment methodology does not account for the fact that exposures early in life to carcinogens can cause much greater risk than the same exposure experienced later.

Even in the rare cases where, as with lead and asbestos, regulatory agencies have looked specifically at the risks to children, government has been slow to implement controls. There are presently no nationally applicable standards for safe lead paint removal, despite the risk of even greater lead exposure for children to lead dust if removal is done improperly. The same sorry situation exists with respect to asbestos removal in many buildings (e.g., public housing) where children may be harmfully exposed to the cancer-causing substance.

Perhaps most significantly, government has consistently failed to act to assure that we can pass on to our children -- and theirs -- a healthy and sustainable environment. Examples abound of government's failure to act in the face of substantial evidence of significant risks to our and our children's health and threats to a sustainable environment for us and future generations. Protective standards for many toxic pollutants in ambient air have not been set, and indoor air pollution has

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38 Marquis, J.K. and G.C. Siek, Sensitive Populations and Risk Assessment in Environmental Policy-Making, in Saxena, J., ed., Hazard Assessment of Chemicals, Vol. 6, Washington, D.C.: Hemisphere Publishing Co. (1988).

Calabrese, E.J., Age and Susceptibility to Toxic Substances, John Wiley and Sons (1986).

remained largely unaddressed. EPA allows dangerous pesticides to stay on the market during its lengthy special review process, despite the fact that such reviews are instituted when EPA receives new data showing that a pesticide presents and environmental or human health hazard, and are intended to determine if and how uses of a pesticide should be cancelled or restricted. Pending the outcome of such reviews -- which can take a decade or more to complete -- children's and adults' exposure to carcinogenic or otherwise very toxic pesticides continues. Risks to groundwater sources of drinking water posed by land disposal of solid wastes, many of which contain hazardous substances, are largely uncontrolled. The lion's share of the risks from this failure falls to our children.

V. Reforms Needed to Protect Children from Environmental Health Threats

The environmental threats to children's health are so pervasive it is difficult to determine where first to seek reforms. Clearly, better enforcement of existing environmental laws is a good place to begin this effort. Similarly, better reporting of childhood disease and monitoring of the childhood environment for chemical exposure levels would improve our understanding of the problem. However, until state and federal laws explicitly acknowledge the unique risks that environmental hazards pose to children, reform measures will do little more than maintain the status quo.

One critical -- and yet to be implemented -- approach to protecting children is requiring that standards governing acceptable exposure to contaminants be set at levels that specifically consider childhood exposure patterns. In other words, drinking water standards would take into account children's greater water intake than adults as a proportion of body weight. Likewise, standards for pesticide residues in food, or tolerances, should factor in greater childhood exposure to pesticides because of children's increased intake of fruits and vegetables.

Legislation, the Food Safety Amendments of 1990 introduced by Congressman Henry Waxman and Senator Edward Kennedy (H.R. 1725/S. 722), to ensure that pesticide tolerances protect children is now pending in both the House and the Senate. However, the price for this and other critical reforms in food safety may be preemption of state laws. Preemption is too high a price for even this step to protect children.

In California, we have a separate opportunity to pass a new law that would for the first time explicitly require that safety standards protect children. This November, California voters will have the opportunity to enact the California Environmental Protection Act of 1990, otherwise known as "Big Green." The initiative, Proposition 128, was crafted by NRDC and California's other major environmental organizations to address the threats from a variety of toxic chemicals and contaminants in our air,

water, food supply and atmosphere. If passed, this sweeping ballot initiative would:

* Phase out by 1996 pesticides whose active ingredients are known to cause cancer or reproductive harms;
* Earmark some $20 million in public funds for research into alternative pest control methods;
* Reestablish permissible pesticide residue levels in food which will sufficiently safeguard the health of children;
* Reduce emissions of chemicals and gases contributing to depletion of the ozone layer as well as to global warming;
* Limit oil and gas extraction within California state waters and develop an oil spill prevention plan;
* Impose strict new standards on the discharge of sewage and toxic waste into California's coastal waters;
* Authorize $300 million in bonds for the acquisition of ancient redwoods and reforestation; and
* Establish a statewide elected Office of Environmental Advocate to oversee implementation of the initiative and other environmental laws.

Chances for passage of Proposition 128 are good. This law would be the first in the country to specifically require pesticide tolerances, or any exposure standard for that matter, to protect children. As such, its passage will set an important national precedent.

VI. Conclusion

In conclusion, NRDC is extremely supportive of this Committee's interest in the environmental threats to children's health. Later this fall, NRDC will launch a new project specifically devoted to protection of children and will keep the Committee informed on our progress. We would be happy to work with the Committee on any of its future endeavors in this area.

Chairman MILLER. Thank you very much. Dr. Jukes, if I listened to you correctly, your suggestion would be, of your testimony, is that the American Academy of Pediatrics were hysterical when they sent the letter on Alar.

Mr. JUKES. I did not say that.

Chairman MILLER. No, I mean, you are suggesting that there is no—that they could not have reviewed the scientific evidence and arrived at the conclusion that they arrived at. And this was a campaign of hysteria. Were they part of that?

Mr. JUKES. No, no, no. Before the data that had been accumulated so far, as I have outlined in my appendix, this was very poor experimental work. The mice all, most of them died, on the high levels. And in one test, they kept the solution around for two or three days until it had decomposed, and so on, and so on. And these various defects in the procedures are what led to a delay in evaluation of UDMH and Alar.

And now I think those have been resolved, and the conclusion is that Alar is not carcinogenic; that UDMH causes damage to the liver of mice at high levels, so that they can metabolize estrogens. And then the estrogens—this is well known—have a carcinogenic effect. And this is analogized by a similar experience in human patients.

Chairman MILLER. Is that the conclusion, Dr. Jackson?

Dr. JACKSON. In 1986, what had happened, number one, is that the family of compounds was recognized as carcinogenic. And the International Agency for Research on Cancer had listed hydrazines, including UDMH, as a carcinogen, even back in 1985.

Now, if you recall, back in 1980 there was a scandal called the Industrial Bio-Test Scandal. And it was a lab that ran tests, animal tests. And they were basically putting in phony results. And there was a great reform in how laboratory tests should be performed. And the standard for what is an adequate study has improved greatly over time.

The studies that came forward over the 20 years on UDMH were done in research labs. They were not done according to these good laboratory practice standards. They were not gold standard stuff. And what we are saying from the Academy of Pediatrics was, "We are not sure this is a carcinogen, but common sense would say let's not put it in kids' applesauce, let's not put it in kids' food until we are sure that it is safe."

The decision by the Advisory Committee was, "No, it does not meet the gold standard. We want to wait several more years and have the study done." I respectfully have to disagree with Dr. Jukes. Our reading of the daminozide cancer bioassay in 1989 is that there is a trend, positive trend test for, I think it is liver in the mouse. And for UDMH at 20 parts per million—this is not a big dose—half the test animals had cancer halfway through their lives, at 20 parts per million, with the UDMH.

At 40 parts per million, when the study was done, virtually all the animals had tumors.

So I did not come prepared to argue UDMH.

Chairman MILLER. No, I understand.

Dr. JACKSON. It is not at my fingertips. But that is the background.

Chairman MILLER. Ms. Goldman, let me ask you something. In terms of the McFarland study, you arrived at the conclusion that you do not know what caused the cancers. Were you able to look at the people in terms of occupation, in terms of employment, with all of the families and/or the victims?

Dr. GOLDMAN. Yes, we were. And actually for both McFarland and Earlimart, the majority of families are employed in agriculture.

Chairman MILLER. Are?

Dr. GOLDMAN. Are. And what that leaves us with is that that is a possible hypothesis. It is a possible cause. But it does not prove that it is the cause.

And so that is why I said that studies are needed in a larger population, in order to get that kind of exposure information on a larger group of children with cancer, and controls. Because a town like McFarland, which is, after all, a farming town, the majority of people who live in that town also work in agriculture. And so the parents are roughly representative of what you would expect for the town.

Chairman MILLER. But were there similarities in terms of how they were employed? Were they employed as farmworkers? Were they employed in packing sheds? Were they employed in offices? Was there a distinct radius within them?

Dr. GOLDMAN. All of those things. Some of them worked in fields; some of them worked in packing sheds; and some of them did not do farm work at all, but did office work or other kinds of work.

But I believe it was something like three-quarters of them had occupations, associated with the possibility for pesticide exposure.

To really nail it down, what you would want to do is, in a much larger group, get information about not only what kind of employment, but also what kinds of pesticides the workers worked with. Because what you would be really curious about is whether specific kinds of pesticides were associated with the cancers.

Chairman MILLER. We are trying to address that in the Farm Bill, as you know. The farmers are resisting the effort to inform people of the kind of pesticides that they are working around.

Dr. GOLDMAN. Yes. Well, it is important, because when we go to take a history, when we are doing one of these studies, it is important that the worker, the parent, can tell us specifically what they were working with. And often, they just do not know. They know that there were bags that had certain kinds of labels, but the labels are not necessarily chemical names. Many of the brand names are used for many different combinations and types of pesticides.

But we do know from the scientific literature that there have been large studies that have shown associations between both parental and child pesticide exposures, and the development of childhood cancers, such as leukemia and brain cancer. And so it is not a far-out hypothesis that pesticides are involved with the McFarland cases. It is just that it is not provable at this point in time, partly because, again, we lack the tools to go back and measure exposure.

Another example is the pesticide use reporting system, which we used to try to estimate what kinds of pesticides, or what quantities, were applied in the area, over the period of time when those cancers would have been induced. And we found that the data in that

system was very poor. And it was not possible for us to get a good handle on that. Now that system has been improved. But to go back in the past, it is very difficult.

Chairman MILLER. Dr. Jackson, let me ask you something. It was suggested by Dr. Jukes that the tolerance levels are set, the standards are set, with—they err on the side of being conservative, in terms of your discussion here on Aldicarb suggests that because of the method of application, or at least it seems to me you are suggesting that the manufacturer's recommended methods of application does not necessarily therefore mean that you will come within the Government standards for that chemical. Is that a fair statement?

Dr. JACKSON. Number one, these tolerances, which are basically the legal limit for what is improved, are almost always based upon a good agricultural practice. In other words, the company goes out, sprays it under the best conditions, figure out what kills the pest, and what can give you the lowest level that the farmer will not lose his crop if it is harvested and found to be at that level. It is set based on agricultural practices.

Congress itself put many of the tolerances in place with a fiat—not a car, but a wave of the hand—in 1972.

The feeling is that many of the tolerances really are not up to speed when you look at the toxicologic data base. And that you do not have an adequate margin of safety. I am not, at the same time, saying that this is any reason for people to panic. I am saying there is a reason for Government to look very closely at how these limits are set.

There was a suggestion that—I just want to make it clear that I do agree with Dr. Jukes that the way to regulate these chemicals is not through food panics. People should not have to be concerned about it. It is Government's job to figure out what is safe, and to regulate what is being used out there. And my argument is that that was done in—if that were done in 1985, no problem would have occurred.

Chairman MILLER. Let's go to that argument. I mean, I think that is one of the points here. When people start to wonder, either rationally or irrationally, about the safety of their children, and let's say the food supply of that child, there are a number of different ways to accomplish that regulation.

As we saw with Alar, where the Government failed, the consumer, in fact, provided that regulation. They worked their way back up to the supermarkets, to the growers, to finding the manufacturer of that product. They provided that regulation.

Now, we are told that, with Aldicarb, that children are receiving this chemical—you are suggesting, Lawrie, through potatoes, correct?

Ms. MOTT. Potatoes, that is right.

Chairman MILLER. So we are back to sort of the same situation. In the school lunch program, they eat potatoes. They go to fast food restaurants, they eat potatoes. And the suggestion is that they may be exposing themselves to harmful limits. Now, that is obviously a subject of debate.

But if you are a parent, with all due respect to the debate, you say, "I am going to protect my child, and I tell you how we regu-

late it. We stop buying potatoes, be they Idaho, Long Island, or wherever they come from." And that puts about an end to it.

And so, you know, we set out a mechanism here where the Government and, I think I have been in Congress long enough to appreciate the pressure from the chemical manufacturers on the regulatory agencies, and on the political system, you know, to look at this differently, or longer, or slower, or faster, whatever, you know, suits their needs. That I can understand why parents say, "The hell with you. No apples, no applesauce, no apple juice." And then the system responds to that.

So it may be that you prefer not to have people do it by—what did you call it, food panic or something like that? Which is a little unfair to parents. But that may be the best mechanism to get the Congresses and the cabal around the chemical manufacturing in this country's attention. Because then they understand the market forces. They always say, "Let the market dictate it." The market just did, last year, in apples.

Market forces work like a champ. They worked on Chilean grapes. They may have only found two grapes. But that suggests perhaps the kind of threshold that the public is expecting from their Government. So we can take this, and the notion, Dr. Jukes, that because we have background carcinogenic agents in our environment, that therefore we should look at these casually—I mean, maybe that is not what you are saying, but your testimony leads you to believe that, come on, this is all going to work out. The residues, the standards are safe. And yet, we know in many instances that those standards are there because of political pressure for economic reasons that have nothing to do with scientific data.

And so I am a little concerned about that. I just finished dealing with radioactive waste. And the people came up and said, "Hey, you know, there is radiation in the environments. Congressman, you fly back and forth to the coast every year; you get more radiation on that flight than you will ever get from this, so we are going to put it in landfills."

On no landfills that I know of they are going to put it in, but I mean, they can try, what the hell.

You know, that worries me. Because there is an expectation that this process is on the level, and that this is subject to serious scientific review. Time and again—what was it, DDB, the fungicide on grains.

Dr. GOLDMAN. EDB.

Chairman MILLER. EDB. You know, the media process fell apart on that one, too, to the detriment of the consumer, the worker, and others. So I do not blame parents that go into a decision they are going to protect their child by withdrawing their purchase of that good.

Go ahead.

Mr. JUKES. Yes, Mr. Chairman. You have brought up the question of Chilean grapes again. I think this is a very important example. Because the Government banned Chilean fruit, right? And Chilean fruit was dumped right and left.

Now, this has to be quantitated. Three micrograms of cyanide——

Chairman MILLER [continuing]. I understand, I understand.

Mr. JUKES [continuing]. And 100 micrograms in one bean. Now, this shows how the public panic can be aroused.

Chairman MILLER. But I guess what I am saying is, when I look at Aldicarb, when I look at EDB, when I look at these different—people are suggesting, "Not now, not now, not now." And yet when we are done, we find out there were harmful effects. And it was because of political and economic considerations, rather than health considerations, as to why studies were delayed, or redone, or reevaluated.

You know, Reagan was great at getting everything reevaluated; you could never get to the end of the process. And that just kept the commodity on the market.

And so there is a reason for skepticism in people's mind about this process, in terms of the protection of their children, or themselves, with these commodities.

Mr. JUKES. Yes, but people can easily be panicked.

Chairman MILLER. People can easily be panicked, but they can also, out of frustration, make what for the moment is a logical decision.

Mr. JUKES. The question of natural carcinogens was brought up by Ms. Mott. And she said they cannot be avoided. I do not agree with that. I think that we have heard today, cigarette smoke, a natural carcinogen. Alcohol, natural carcinogen. These can be avoided. High-fat diets can be avoided. These are important things.

Chairman MILLER. No question about that.

Mr. JUKES. No question. In fact, I regard barbecue pits as carcinogen factories. And against that, we should be thinking of anti-carcinogens. We should be thinking of Vitamin C; we should be thinking of Vitamin E at higher doses than the RDA's.

Chairman MILLER. But I do not know why that mitigates the discussion of this. I do not know why you suggest because these naturals exist, if we have not conquered, while we have made great strides on smoking, we have not conquered it, we cannot discuss this. I think this needs to be discussed, especially as we understand latency periods, and we understand all of the physiological issues that are raised about children.

Mr. JUKES. It needs to be discussed, but it needs to be put in focus, and quantitated. And that is what Professor Ames is trying to do.

Chairman MILLER. I do not know Professor Ames.

Mr. STARK. I must admit to my closet credentials here as a great scientist. Governor Sununu and I both went to the Massachusetts Institute of Technology, where I——

Chairman MILLER. So much for that institute. [Laughter.]

Mr. STARK [continuing]. Have had seven semesters of second-semester freshman chemistry, probably having completed more brown ring tests than any other human being; record that still stands in the Guinness Book.

And what I am hearing here is that what we really ought to do with hand cultivation, causing a lot of disabling injuries in farmworkers, we should encourage the use of Paraquat as a way to prevent lower back pain. And I think you can extrapolate those sorts of things all the way down.

I am concerned—Doctor, this Alar and stuff, builds up in your body? Or do you flush it out every day, or periodically?

Dr. JACKSON. They do not bioaccumulate. Every time—actually, the basis of the disagreement between the threshold school or carcinogens and the people that believe there is no threshold is that, with a carcinogen, many of us believe you are basically buying a lottery ticket every time you take that exposure. And maybe you win, maybe you lose, maybe you do not.

And that is not entirely agreed upon. The Europeans do not, for example, believe that. And that is why they are willing to accept a threshold for these chemicals.

Mr. STARK. In alcohol, I wanted to ask Dr. Bearer because it will make my dinner table discussion somewhat less contentious this evening. I understand that the fetal alcohol syndrome—is even a minuscule amount of alcohol in some albeit imperceptible way harmful to the fetus? Or is there some instance that a moderate amount might be absolutely negative on its effects?

I do not know that. My suspicion is that that is not the case, but I do not——

Dr. BEARER. I do not know that, either. Fetal alcohol syndrome is all the way at one end of the spectrum of problems that we know that alcohol causes in the fetus. So you have to have three minimal criteria to meet the diagnosis of fetal alcohol syndrome.

That is probably the tip of the iceberg. The majority of kids that are affected by alcohol have this thing called fetal alcohol effects. And without having any kind of diagnostic test, or any biological marker for those children, it is awfully hard to say who has been affected and who has not.

One recent study that has come out from Seattle was done by the original group who coined the phrase "fetal alcohol syndrome." And they looked at reported drinking in white, upper-class mothers who could report one episode of drinking five drinks at one time, which they called one episode of binge drinking. And they looked at the outcome of their children. I think the study was done for four or five years out.

So at a time when you were fairly reliably able to measure a kid's developmental quotient, or their IQ, their mental development. And they found that in that population, when they looked at a large population of these children, their IQs were—their mean of their IQs—were significantly lower than in mothers who were abstinent during their pregnancies. That none of those kids from the mothers who could report this one episode had children whose IQs fell in the range considered brilliant or above genius level. And that they were significantly increased at the lower end of that scale: kids who were mentally retarded, or below an IQ of 70 to 80.

Mr. STARK. Has anybody, and do any of the physicians know, has anybody even attempted or suggested that moderate amounts, as they have talked about it for people my age, maybe would be helpful to a fetus? I mean, that has never even surfaced, I thought.

Dr. BEARER. Actually, the opposite has been shown, not for mental development, but for birth weight. That moderate and even small amounts can cause a decrease in birth weight, which is considered to be a biological end point that is very important.

Mr. STARK. Okay. So I——

Dr. BEARER. That is why we put out warnings about drinking during pregnancy.

Mr. STARK. Dr. Jukes?

Mr. JUKES. Your point is, maybe one drink will not do any harm. And there probably is a threshold for the effect. But I think it is a psychological problem we have here. One drink leads to another.

Mr. STARK. You bet. And as long as it is Livermore Valley Wine, that is okay. But not too many to get to eight-tenths on your breathalizer.

Dr. BEARER. I think that is a good point that Dr. Jukes makes, that there is no known benefit to alcohol drinking. It is not a vitamin; it is not an essential mineral. There is no adverse health effect known from not having a drink of alcohol.

So prudent precaution would be that you do not drink, not even when you know you are pregnant, but when you are thinking of getting pregnant. Before your pregnancy starts. Oftentimes, the most sensitive period to the fetus is before you know you are pregnant.

This is another cause for concern for exposures, also, environmental exposures, is that often women do not know that they are pregnant. The fetus is undergoing the period of organogenesis, when it is particularly susceptible to birth defects. And women do not know they are pregnant. And they are still subjected to the same exposures that other people are.

Mr. STARK. No, I just wanted to be even-handed here. I did not want to go overboard. [Laughter.]

Mr. JUKES. Also, Mr. Stark, alcohol is a known human carcinogen, one of the few known human carcinogens.

Mr. STARK. Yes. The only other question I have is—and I would ask Dr. Sandoval to pitch in here, but I would ask Dr. Sandoval and Dr. Jackson, Dr. Bearer and Dr. Goldman—if any of them have any basic, absolute objection to national health insurance.

Dr. BEARER. I will be brave. I do not.

Dr. JACKSON. No.

Mr. STARK. Thank you. Let me ask you, Mr. Chairman, as I say, I just think that what you are doing here, we have heard allusions to the third world. For many of us in Oakland, we have third world health conditions here for many of our children. And we are here. We do not have——

Chairman MILLER. That is a point I wanted to make. There is, in the testimony and in the staff work for this hearing, there clearly is again the whole underlying environmental framework in which many of the children we have been talking about, and the families that we have been talking about, find themselves in. And really the inability for early diagnosis for treatment for prevention, whether those children manifest themselves in the emergency rooms in Oakland or in the Head Start Program in Madera.

The fact is that the availability to make these early determinations about the health of the children, which gives us concern.

The other issue that has been raised here is the notion, and it was raised I think last month or several weeks ago in another respect, and that is the extent to which research and the notions of setting standards are incorporating the differences that we understand about children.

Congresswoman Schroeder, a member of this committee, raised this with respect to the National Institutes and women. And the involvement not only of women in the research, but recognizing again the research has got to make considerations about physiological differences in the subjects.

And this hearing is about developing that, recognizing that if there are carcinogens in the carpets, they may not affect the parents to the extent to which they affect the children, who are rug-runners, run around on those carpets all day long. And that there are these gradients that exist in our environments that may, in fact, pose greater danger to children, simply by virtue of the fact that they are children.

And I think it is a distinction that the Congress can no longer ignore. So very often, whether it is the health environment, or the economic environment, or what, we find that children are reduced in their abilities to take advantage of opportunities in this society simply by virtue of their environment. And in this instance, that is not something that we can tolerate.

So I want to thank you very much for helping us break this out a little bit. This is, as I pointed out earlier, a beginning of a series of issues around children and their environment, and risks that are posed to them.

The record of this hearing will remain open for a period of two weeks. And we would welcome the views and the comments of individuals in the audience, or others that would like to do so, to have that made part of this record. So when we get down to the point of writing a report, we are fully informed.

Thank you very much for your time, and your willingness to come forward and to testify to the committee. I appreciate it very much.

Thank you, Pete, for joining us, and Congresswoman Boxer. And again, to Children's Hospital, Oakland, for all of their support activities that they have provided to the committee.

With that, the committee will stand adjourned.

[Whereupon, at 12:16 p.m., the committee was adjourned.]

[Material submitted for inclusion in the record follows:]

PREPARED STATEMENT OF GWEN HARDY, MEMBER, PEOPLE UNITED FOR A BETTER OAKLAND, OAKLAND, CA

To the Select Committee on Children, Youth, and Family:

As a concerned resident of Oakland and member of People United for a Better Oakland, I recently attended the Select Committee's Public Hearing at Children's Hospital on Thursday, September 6, 1990. I was deeply disappointed that public participation was not allowed. People United has been making demands around the issue of lead poisoning for over a year and a half. We are a multi-issue, multi-ethnic grassroots organization located in Oakland, California. We are fighting for better and more accessible healthcare, education, and childcare, as well as opportunities for our youth. Since our beginnings nearly two years ago, we have been concerned with the problem of lead, among other healthcare issues. We have successfully fought for more translators at our county hospitals, multi-lingual helath information and outreach, and free measles vaccinations for thousands of low-income children. However, we must now focus on lead poisoning. We are the people who are most affected by it. While the information that the doctors, scientists and researchers passed on is important, the committee needs to hear from those who are most affected by lead poisoning- the community. I am taking this written opportunity, since it was denied to us during the hearings, to let you know how we feel.

Two years ago, the State of California released a study showing that the Oakland community is heavily contaminated with lead. However, nothing, to this date, has been done by the state, county or city to reduce or eliminate lead poisoning here. Our community does not need to continue to serve as lab rats. Enough research and studying has been done. We know the effects that lead poisoning has on humans, from the undeveloped fetus to grown adults. We know what needs to be done to eliminate the problem. Our community and the medical community must be educated. The business community, property owners (including the state), large corporations and factories must be educated, monitored and held accountable around lead. Politicians, who are often swayed by the interests of the previously mentioned, must not fall prey to them. Instead,

you must take an active stance against those interests and work for the people's health.

It is a mistake to look at lead poisoning as a poor person's disease. Anyone can suffer from it, as Millie the White House dog proved. I would hate to think that
our politicians have not acted on this issue because it disproportionately affects low-income people and people of color. We suffer more because we don't have access to quality health care, not because we don't keep our homes clean or don't care. Millie was quickly taken to a veterinarian, tested, treated, and taken on vacation to recuperate. Most children who suffer from lead poisoning are not even tested. Low-income or uninsured kids can't get the treatment that Millie was able to receive.

I would like to stress that we are not looking for charity or another program that will sweep poor people under the carpet. We are concerned about the health of everyone. As normal citizens, business people, and politicians, we always say that the children are our future. Well, they are our present also and if we don't deal with lead poisoning in the present, we won't have that future. If they are contaminated now, they will be denied a healthy and fulfilling future. There are several ways that you can help alleviate the problem of lead poisoning now.

•Urge the Center for Disease Control to alter their policy on lead poisoning immediately. The CDC has said that they now consider any exposure to lead harmful and are considering lowering the medical intervention standard to 10 micrograms per deciliter. State, county and city health departments look to the CDC for these guidelines before they change their own policies. Demand that the CDC lower the intervention rate now and include an active testing and treatment plan.

•Make the Early and Periodic Screening Diagnosis and Treatment Plan (EPSDT, locally known as the Childhood Health and Disability Prevention Program, CHDP) accountable around lead testing and treatment. These programs provide money for the testing and treatment of low-income and uninsured kids. However, the majority of kids eligible for this

program are not even getting tested. The money is already there. Let's put it to work!

•Recognizing that solutions at the federal level take time, we ask that you contact members of the Oakland City Council and urge them to pass the lead ordinance authored by People United that is currently tied up at the Public Works Department. This ordinance addresses the issues of screening, treatment, education, abatement, and prevention. This ordinance will be introduced to the Council in October of 1990.

Please take action soon. We cannot afford to let our children suffer through one more day of lead exposure. I hope that the Committee will fulfill its mission in improving the situations of children nationwide. I thank you for your time and consideration.

Sincerely,

Gwen Hardy
Member, People United for a Better Oakland

cc: David Kears, Director, Alameda County Health Care Services Agency
Lionel Wilson, Mayor of Oakland
Dr. John Rosen, Chairman, Lead Panel, Centers for Disease Control
Jane Perkins, National Health Law Program
Kenneth Kizer, Director, California State Department of Health

PREPARED STATEMENT OF BRUCE N. AMES, DIRECTOR, N.I.E.H.S. ENVIRONMENTAL HEALTH SCIENCES CENTER, UNIVERSITY OF CALIFORNIA, BERKELEY, CA

PESTICIDES AND CANCER

Synthetic pesticide residues do not present a significant risk to either children or adults. In general, fear of pesticides is based on a misinterpretation of animal cancer tests.

1) Animal cancer tests are conducted with enormous doses of the test chemical: the maximally tolerated dose that does not kill the animals outright. New evidence suggests that effects triggered by these very high doses--chronic cell killing and cell division-- are risk factors for cancer. In other words, it is the high dose itself that causes cancer. Thus, a high percentage of all chemicals might be expected to be carcinogenic at maximally tolerated doses. This is exactly what is found. About *half* of all chemicals tested in chronic studies at these massive doses are rodent carcinogens.

2) Of the chemicals that have been subject to testing for carcinogenicity in rats and mice 82% are synthetic, despite the fact that almost all chemicals in the human diet are natural. Therefore, it is important to determine whether a high proportion of natural chemicals is also cancer-causing at high doses. My colleagues and I have analyzed pesticides in detail, and we calculate that 99.99% (by weight) of the pesticides in the human diet are naturally-occurring chemicals that plants produce to defend themselves. Only 52 natural pesticides have been subject to cancer testing, and again about half (27) are rodent carcinogens; these natural pesticides are present in most common foods. Adults eat about 1500 milligrams of thousands

of these chemicals per day; this compares to 0.09 milligrams of about 100 synthetic pesticide residues. Of the natural mold toxins that have been tested for carcinogenicity, 11 out of 16 are carcinogens, including aflatoxin. In addition, from cooking our food, we eat thousands of chemicals that add up to about 2000 milligrams per day. For example, only 22 chemicals in roasted coffee have been tested: 17 are carcinogens totalling 10 milligrams per cup. Our tiny exposures to pesticide residues should be compared to an enormous background of natural substances. My colleagues and I conclude that natural and synthetic chemicals are equally likely to be positive in high-dose animal cancer tests, and are similar in their toxicology. We also conclude that at the low doses of most human exposures, where cell-killing does not occur, the hazards may be much lower than is commonly assumed and often will be zero. Evidence from both epidemiology and toxicology suggests that synthetic pesticide residues are not likely to be a significant cause of cancer.

3) The number of storks in Europe has been decreasing for decades. At the same time, the European birth rate also has been decreasing. We would be foolish to accept this high correlation as evidence that storks bring babies. The science of epidemiology tries to sort out the meaningful correlations from the numerous chance correlations. That is, epidemiology attempts to determine correlations that may indicate cause and effect. However, it is not easy to obtain persuasive cause-and-effect evidence by epidemiological methods, because of inherent methodological difficulties. There are many sources of bias in observational data, and chance variation is also important. For example, because there are so many different types of cancer or birth defects, by chance alone one might expect some of them to occur at a high frequency in a small community here and there. Toxicology provides evidence that can help us decide whether an observed correlation might be causal or accidental.

There is no persuasive evidence from epidemiology or toxicology that pesticide residues or water pollution is a significant source of birth defects or cancer. For example, the epidemiological studies of the Love Canal toxic waste dump in Niagara Falls, New York, or of dioxin in Agent Orange, or of pollutants produced by the refineries in Contra Costa

County, California, or of the contaminants in the wells of Silicon Valley, or Woburn, Massachusetts, or the now-banned DDT pesticide, provide no persuasive evidence that pollution was the cause of human cancer in any of these well-publicized exposures. At Love Canal, where people were living next to a toxic waste dump, the epidemiological evidence for an effect on public health is equivocal. Analyses of the toxicology data on many of these cases suggests that the amounts of the chemicals involved were much too low relative to the background of naturally occurring carcinogens and carcinogens from cooking food to be credible sources of increased cancer in humans.

Historically, for chemicals that have been shown to increase cancer in the workplace, exposures were at high levels. For example, in California the levels of the fumigant ethylene dibromide (EDB) that workers were allowed to breathe in were once shockingly high. We testified in California in 1981 that our calculations showed that the workers were allowed to breathe in a dose higher than the dose that gave half of the test rats cancer. California lowered the permissible worker exposure more than a hundred-fold. Despite the fact that the epidemiology on EDB in highly exposed workers does not show any significant effect, the uncertainties of our knowledge make it important to have strict rules about workers, because they can be exposed chronically to extremely high doses.

4) DDT is often viewed as the typically dangerous synthetic pesticide because it persists for years; it was representative of a class of chlorinated pesticides. Natural pesticides, however, also bioconcentrate if fat soluble: the neurotoxins solanine and chaconine, for example, are present in high levels in potatoes and are found in the tissues of potato eaters. These natural potato toxins have been shown to cause neural tube defects in the offspring of pregnant rodents. Although DDT was unusual with respect to bioconcentration, it was remarkably non-toxic to mammals, saved millions of lives, and has not been shown to cause harm to humans. To a large extent DDT, the first major synthetic insecticide, replaced lead arsenate, a major carcinogenic pesticide used before the modern era; lead arsenate is even more persistent than DDT. When the undesirable bioconcentration and persistence of DDT

and its lethal effects on some birds were recognized it was prudently phased out, and less persistent chemicals were developed to replace it. Examples of these newer chemicals are the synthetic pyrethroids that disrupt the same sodium-channel in insects as DDT, are degraded rapidly in the environment, and can often be used at a concentration as low as a few grams per acre.

5) Congressman George Miller's Fact Sheet mentions the neurotoxic organophosphate pesticides that children are exposed to. The levels in food are tiny and insignificant. There are numerous naturally-occurring neurotoxins in human diets, and the risk of toxicity from these is far greater than the risk from normal exposures to synthetic pesticides. For example, certain cultivated crops have become popular in developing countries because they thrive without costly synthetic pesticides. However, the tradeoffs of cultivating some of these naturally pest-resistant crops are that they are highly toxic and require extensive processing to detoxify them. Cassava root, a major food crop in Africa and South America, is quite resistant to pests and disease; however, it contains cyanide at such high levels that only a laborious process of washing, grinding, fermenting, and heating is necessary make it edible; ataxia due to chronic cyanide poisoning is endemic in many of the cassava-eating areas of Africa. In one part of India, the pest-resistant grain *Lathyrus sativus* is cultivated to make some types of dahl. Its seeds contain the neurotoxin beta-N-oxalyl aminoalanine, which causes a crippling nervous system disorder, neurolathyrism.

In the United States, a new potato, developed at a cost of millions of dollars, had to be withdrawn from the market because of its acute toxicity to humans when grown under particular soil conditions—a consequence of higher levels of the natural neurotoxins solanine and chaconine. Solanine and chaconine inhibit cholinesterase, thereby blocking nerve transmission; as discussed above, they are also known to cause birth defects in rodents. Potatoes were widely introduced into the world diet about 400 years ago with the dissemination of the potato from the Andes. Total toxins are present in normal potatoes at a level of 15 mg per 200-g potato (75 ppm), which is less than a ten-fold safety margin from

the measurably-toxic daily dose level for humans. Neither solanine nor chaconine has been tested for carcinogenicity. In contrast, the cholinesterase inhibitor malathion, the main synthetic organophosphate pesticide residue in our diet (0.006 mg per day), has been tested at the maximum tolerated dose and is not a carcinogen in rats or mice.

6) Congressman Miller's Fact Sheet raises the issue of a link between synthetic pesticide residues and birth defects. We believe the evidence does not support such a connection. Concern about trace levels of pesticides diverts the public's attention from real risks to insignificant ones. By far the major single cause of birth defects in the U.S. is maternal alcohol consumption, which can lead to Fetal Alcohol Syndrome; 10,000 babies per year in the U. S. are born mentally retarded because their mothers drink excessive amounts of alcohol during pregnancy. Other major risk factors for birth defects are maternal dietary deficiencies. A pregnant woman's deficiency in folic acid, for example, can lead to neural tube defects in her babies. Another major risk factor for poor infant health is maternal cigarette smoking, which often causes premature birth and low birth weight. By contrast, there is no epidemiological or toxicological evidence to link normal exposures of synthetic pesticides with birth defects.

7) The important consideration is that synthetic pesticides have markedly lowered the cost of fruits and vegetables and other plant foods, thus increasing consumption. Eating more fruit and vegetables is known to prevent cancer. The vitamins (such as folic acid), antioxidants, and fiber that come from plants are anticarcinogenic.

Thus, misconceived efforts that frighten the public about synthetic pesticide residues on their foods are counterproductive.

SUPPLEMENTAL STATEMENT OF THOMAS JUKES, PH.D., DEPARTMENT OF BIOPHYSICS, UNIVERSITY OF CALIFORNIA, BERKELEY, CA

The NRDC spokesperson at the hearings on September 6 criticized me for reporting data on total child mortality from cancer rather than from data on cancer incidence. I chose to do this because the figures on total incidence are unreliable and that data on mortality are definite. However, I did report incidence figures on one form of child cancer, acute lymphocytic leukemia, because this is easily diagnosable, and I pointed out that incidence of this had increased but the mortality rate had decreased (p. 8 of my statement).

The sensational publicity manufactured by NRDC for Alar has had the effect of diverting attention from many problems faced by children. A few of these, including lead poisoning, passive smoking and fetal alcohol syndrome were discussed by witnesses on September 6, but others were not mentioned. These include deaths and injuries inflicted on children by drunk drivers, child abuse and neglect, malnutrition, the need for immunization, and bacterial toxins, including food contamination. Alcohol and tobacco are the two major environmental toxins by virtue of their side effects as well as their direct action. I hope that the Committee will broaden its scope of interest, and will work to protect children on all fronts and on a bi-partisan basis.

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9 September 1990

Honorable George Miller
U.S. House of Representatives
385 House Office Building Annex 2
Washington DC 20515

Dear Congressman Miller:

I thank you for inviting me to make a statement before the hearing in Oakland on September 6. I also thank you for your judicious discussion of my testimony. May I point out that, when you questioned me about the use of the term "hysteria," I was quoting the usually staid Mayo Clinic Newsletter. But I think that my speaking of the "apple and grape" incidents as "panics" was justified by what happened.

I was gratified that your hearing emphasized the need for protecting farm workers.

I am enclosing some information I wanted to add to the discussion, but time did not permit this.

Sincerely,

THOMAS H. JUKES

THJ/ra

enclosures

COMMENTS OF BARBARA KEATING, EDH, PRESIDENT, CONSUMER ALERT, MODESTO, CA

Scientific evidence shows harm to children from consuming old paint chips containing lead. Efforts should continue to remove this risk to children. The risk is present in certain areas where children still live in old buildings.

New evidence has emerged as well, though still under dispute in scientific circles, that passive smoking may adversely affect children aggravating asthmatic conditions and worse. Recent reports indicate children growing up in homes in which both parents smoke doubles their risk of developing lung cancer later in life....though it is unclear how many of these children also become smokers themselves, thereby contributing to their own health risks. It is quite likely that children of smokers will become smokers themselves unless otherwise discouraged through education.

Principle risks occur to developing infants from prenatal abuse of alcohol and drug abuse. These present children with lifelong handicaps.

Beyond these circumstances, scientific evidence shows no increased risk to children or infants from environmental factors.

The ALAR fright was simply that, a deliberate and unfortunate alarm that caused more damage by interrupting the eating habits of healthy children than from the effects of residues.

The Committee may need to be reminded that not one single episode involving children has ever emerged from their eating apples that were treated with the growth enhancer, ALAR. This chemical was used by a relatively small number of apple growers to increase stem strength enabling the fruit to hang onto the tree longer to ripen, rather than falling to the ground where it would quickly become contaminated by insects.

The hysteria over "pesticide residues" as it relates to people- adults as well as children, is unwarranted in light of overwhelming scientific evidence subjected to peer review. Claims and statements made by some activists whose work fails to pass a review by their peers in science is discounted by our organization. CONSUMER ALERT doesn't run with the pack. An independent organization, it seeks truth, not political popularity.

In fact, it is known that human body cells have a marvelous way of resisting the toxins (the vast majority of which are naturally occurring) that surround us and with which we are bombarded constantly. Cells continue to regenerate over and over as we move through life, literally sustaining good health. As we grow older, the cell's ability to regenerate while avoiding malignancy, lessens. The longer we live, the more

regeneration, the greater the chance of wayward cells taking hold and a malignancy developing. This points clearly to the fact that, as children, we are less inclined to get cancer than as we grow older!

Epidemiological studies show absolutely no rise in overall cancer rates in the United States . (With the exception of lung cancer among those who smoke.) When age is factored in, (taking into account our aging population) most cancers are actually on the decline and we don't even know why this is so.

Those who continue to raise concern about carefully regulated pesticide use and residue exposure, as well as other chemicals used in our society do so in spite of evidence to the contrary. They avoid addressing the levels of exposure at which toxicity occurs. Nearly everything is toxic at some level of exposure -- including, and most certainly, chlorine in our drinking water, but we would never suggest removing it, for the dangers of going without, are much greater.

There is public appeal in raising a cry over the anguish that cancer in children causes. Childhood cancer is dramatic, and so opposing it has political appeal. Cancer in children, though particularly emotionally traumatic, is actually rare, all things considered. The very fact that younger bodies reproduce their cells more readily than older people, grants special protection to children that we surely lose as we age. Those who want to believe that cancer in children is prevalent among those exposed to pesticides can surely find a single sad case to bring forward, can surely convince suffering parents that "someone's to blame", but the fact remains, cancer has many causes. Exposure to chemicals at allowable levels is extremely low on the list of causes. So low in fact, as to be considered zero likelihood by most well respected toxicologists.

European farmers use four times the amount of pesticides that U.S. farmers use and yet Europe's overall cancer rate continues to decline as well.

If one is truly concerned about children however, one must face facts that well fed children on balanced diets are healthy children with the best chance of defeating dread disease. In light of the fact that food is a major portion of the expenditure of poor families, lower cost and readily available food is a goal worth pursuing. The World Health Organization recently reported that only one half of the world's population is properly nourished and at least one and one half billion of the world's people are underfed. One third of the world's food production is lost to pests, crop diseases and weeds before it is harvested. Careful use of chemicals in farming then, increases the availability of affordable food. Pesticides

enable more affordable food to be available to more people. Better diets reaching more people surely means healthier children.

Focus would be better placed on celebrating the rising advantages to children which our higher standard of living provides --antibiotics, better health care, better diets, immunization against deadly diseases, safer playthings, and certainly better diets than children in the world throughout history have ever enjoyed.

Rather, we urge this important Committee on Children, Youth and Families to focus on and effectively tackle the real threat to children today which in many ways is more devastating, painful, costly and permanent than cancer.

Last year one out of every four American homes experienced some sort of violence. In the past 24 months reports of child abuse and neglect doubled. There is nothing to gain by outlining to the members of this Committee the suffering, horror and permanent scars that result from the all too frequent abusive treatment which increasing numbers of adults heap upon defenseless children and infants. We can only urge the Committee to refrain from wasting valuable time chasing mirages set up by activists with their own political agenda, and to instead use one hundred percent on its energies, intellect and might to solving a real and critical problem - that of child abuse and neglect. No one denies that it is rampant!

In the moments when this testimony was being prepared, hundreds of children cried from hunger and neglect, hundreds more suffered helplessly at the hands of abusive adults. Surely, some few also suffered and died from the dread disease of cancer but there is no scientific evidence that those malignancies resulted from anything our society caused to happen. Child abuse, equally crippling and deadly, on the other hand, is indeed the result of human behavior which can, and must, be changed. I urge that this Select Committee on Children Youth and Families focus its attention on the real dangers which confront children in our society today.

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